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A MONOGRAPH

OF

THE GAULT,

BEING

THE SUBSTANCE

OF

A LECTURE

DELIVERED IN

THE WOODWARDIAN MUSEUM, CAMBRIDGE, 1878,

AND BEFORE

THE GEOLOGISTS' ASSOCIATION, 1879.

BY

F. G. HILTON PRICE, F.G.S.

LONDON:
TRÜBNER AND CO., LUDGATE HILL;
TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.
1880.

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INTRODUCTION.

THE Gault is a deposit of blue, grey, and sometimes of reddish clays and marls, which are met with in the middle of the Cretaceous strata above the topmost beds of the Upper Neocomian formation, viz. the zone of *Ammonites mammillaris,* and is by the majority of French geologists looked upon as Gault; but English geologists differ as to this division, the reason for which will be given further on in this work.

The lower beds of the Gault in Kent, Sussex, Surrey, Cambridge, &c. consist of stiff blue clay; the Upper Gault is greyer and more marly. In Norfolk and parts of Yorkshire, the representative of the Gault consists of red marly clays, and in parts of East Sussex it sometimes consists of brown, red, and yellowish clays, passing into black shales. In many parts of France it partakes of a yellow and greenish sandy nature.

In some places its soil is known agriculturally as the "black land."

The term "Gault" appears to have been used in Cambridgeshire and Lincolnshire alike for all dark-coloured clays, whether Kimmeridge, Oxford, or Gault.

It is recorded that William Smith (the father of English Geology) was the first to give this name to the formation, which was originally in use amongst the workmen of Cambridgeshire. It was variously spelt *galt*, *golt*, and *gault*, and has been at times described as Folkestone marl and blue chalk marl.

In the following pages it is the author's intention to describe the Gault, and give some idea of its geographical extension in England and France, and to show by correlation the various equivalents of the Gault of Folkestone, and to append lists of fossils.

The clays of the Gault originated in the trituration of the neighbouring lands, which in England, on the west side of the Anglo-Parisian basin, were for the most part composed of Jurassic or Neocomian rocks ; on the north-east of the basin, *i. e.* the Ardennes, the sea laved Primary rocks ; whilst on the east and south-west of the basin the waves beat against cliffs composed of granites, porphyries, Jurassic and Neocomian rocks.

It is in this manner that the composition of the Gault varies in different localities, according to the nature of the adjacent lands at the time of its deposition ; and as these different conditions obtained, so did the fauna vary in the several localities.

THE GAULT.

CHAPTER I.

BIBLIOGRAPHY.

With regard to the bibliography of the Gault, comparatively nothing of importance has been written about it until within the last sixteen years, which is somewhat surprising when one considers how exceedingly fossiliferous the deposit is, and what perfect specimens have been met with in the Gault of Folkestone and other places.

The following is a list of the titles of various papers bearing upon the subject.

1700. Brome, Rev. J. Travels over England, Scotland, and Wales. In which Gault fossils are noticed on p. 274.

1819. Parkinson, J. Remarks on the Fossils collected by Mr. Phillips near Dover and Folkestone. Trans. Geol. Soc. ser. 1, vol. v. p. 52.

1819. Phillips, W. Remarks on the Chalk Cliffs in the Neighbourhood of Dover, and on the Blue Marl covering the Greensand near Folkestone. Ibid.

1824. Mantell, Dr. G. A. Notice accompanying some Specimens from the Blue Chalk Marl (Gault) of Bletchingley. Trans. Geol. Soc. ser. 2, vol. i. p. 421.

1836. Queries regarding some Fossil Coprolites (?) from the Gault at Folkestone. Loudon's Mag. Nat. Hist. vol. ix. p. 47.

1836. Fitton, Dr. W. H. Remarks on some Strata between the Chalk and the Kimmeridge Clay in South-east of England. Trans. Geol. Soc. ser. 2, vol. iv. p. 103.

Dr. Fitton was the first geologist to indicate the extension of the Gault through England.

1838. Michelin. Sur une argile dépendant du Gault, observée au Gaty, près Gérodôt. Mém. Soc. Géol. de France, t. iii. p. 97.

1838. Cottet. T. crétacé de l'Aube. Mém. de la Soc. d'agriculture Sc. et Arts du dép. de l'Aube, pp. 94, 117.

1839. De Sénarmont. T. crétacé de l'Aube. Annal. des Mines, 3e sér. t. xv. p. 463.

1841. Leymerie. Mém. sur le T. crétacé du dép. de l'Aube. Mém. Soc. Géol. de France, t. iv. p. 291.

1842. Leymerie. Ditto. Mém. Soc. Géol. de France, t. v. p. 1.

1843. Raulin. Observations sur le Gault des Ardennes. Bull. Soc. Géol. de France, 1er sér. t. xiv. p. 485.

1844. Buvignier. Observations sur des nodules fossilifères du Gault. B. S. G. F. i. p. 169.

1845. Simms, F. W. On the Thickness of the Lower Greensand beds of the South-east Coast of the Isle of Wight. Quart. Journ. Geol. Soc. vol. i. p. 76.

1845. Fitton, Dr. W. H. Comparative Remarks on the Sections below the Chalk on the Coast near Hythe in Kent and Atherfield in the Isle of Wight. Quart. Journ. Geol. Soc. vol. i. p. 179.

1849. Ibbetson, Capt., LL.B. Notes on the Geology and Chemical Composition of the various Strata in the Isle of Wight. London.

1854. Renevier. Mém. Géol. sur la perte du Rhône.

1840–1855. D'Orbigny. Paléontologie Française.

1856. Mackie, S. J. A Handbook of Folkestone.

1856. Woodward, Dr. S. P. On the occurrence of the Fossil Genus *Conoteuthis*, D'Orb., in England (Folkestone Gault). Ann. & Mag. Nat. Hist. ser. 2, vol. xvii. p. 402.

1858. Mackeson, H. B. A Short Account of the Cliff-section between Folkestone and Dover. Geologist, vol. i. p. 438.

1858. Gosselet. Sur l'existence du Gault dans le Nord et le Hainaut. B. S. G. F. xvi. p. 122.

1858–67. Pictet et Campiche. Description des Fossiles du Terrain crétacé des environs de Ste Croix. 3 vols. Geneva: H. Georg.

1859. Wiltshire, Rev. Thos., F.G.S. On the Red Chalk of England. Proc. Geol. Assoc., April 1859.

1860. Gaudry, Prof. Albert. Sur la découverte de l'*Ostrea Leymerii* à Wissant (Pas-de-Calais). (Note on the Junction of the Gault and Lower Greensand at Folkestone.) Bull. Soc. Géol. de France, sér. 2, tome xvii. p. 736.

1860. Mackie, S. J. Geological Localities.—Folkestone. Geologist, vol. iii. pp. 41, 81, 121, 201, 281, 321, 353, 393.

1860. Heathorn, R. On a Course of Cropping adopted in Kent. (At Aylesford on Gault and Lower Greensand.) Journ. Roy. Agric. Soc. ser. 1, vol. xxi. p. 385.

1861. Curtis, W. Notes on the Fossils of the Gault from the Alice-Holt Forest, near Alton. Proc. Geol. Assoc. vol. i. no. 7, p. 152.

1861. Mackie, S. J. Figures of Gault Fossils from Folkestone. Geologist, vol. iv. Supplement.

1861. Seeley, Harry. Notice of Opinions on the Stratigraphical Position of the Red Limestone of Hunstanton. Ann. & Mag. Nat. Hist. ser. 3, vol. vii. p. 233.

1863. **Bell**, Prof. A Monograph on Crustacea of the Gault and Greensand. Pal. Soc. for 1862.

1863. **Blake**, C. **Carter**. On a new Fish-jaw from the Gault near Folkestone. Geologist, vol. vi. p. 133.

1863. **Ebray**, T. Stratigraphie de l'étage Albien dans les dép. de l'Yonne, de l'Aube, de la Haute-Marne, de la Meuse et des Ardennes. B. S. G. F. xx. p. 209.

1863. **Meyer**, C. J. A., F.G.S. Age of Blackdown Beds. Geologist, vol. vi. p. 50.

1864. **Lehon**. Note sur les couches Néocomiennes et Albiennes de Wissant. B. S. G. F. xxi. p. 14.

1864. **Tate**, **Ralph**, F.G.S. A Descriptive Catalogue of the *Pterocerœ* of the Cretaceous Rocks. Geol. & Nat. Hist. Rep. vol. i. p. 91.

1864. **Tate**, **Ralph**, F.G.S. On the so-called *Rostellariœ* of the Cretaceous Rocks, with a Descriptive Catalogue of the British Species. Geol. & Nat. Hist. Rep. vol. i. p. 93.

1864. **Whitaker**, W., F.G.S. On the Cliffs at Folkestone. Geol. Mag. vol. i. p. 212.

1864. **Woodward**, Dr. S. P. Note on *Plicatula sigillina*, an undescribed Fossil of the Upper Chalk and Cambridge Phosphate Bed. Geol. Mag. vol. i. p. 112.

1864. **Wright**, Dr. T. A Monograph on the British Fossil Echinodermata from the Cretaceous Formations. Vol. i. pt. 1. Pal. Soc. for 1862.

1864. **Pictet**. Note sur la succession des Moll. Gastéropodes.

1865. **De Rance**, C. E. Phosphate-bed at Folkestone. Geol. Mag. vol. ii. p. 527.

1866. **Meyer**, C. J. A., F.G.S. Notes on the Correlation of the Cretaceous Rocks of the South-east and West of England. Geol. Mag. vol. iii. p. 13.

1866. **Renevier**, E. Notices Géologiques et Paléontologiques sur les Alpes Vaudoises. Environs de Cheville. Bull. de la Soc. Vaud. &c. t. ix.

1868. **Topley**, **William**, F.G.S. On the Lower Cretaceous Beds of the Bas-Boulonnais, with Notes on their English (Kentish) Equivalents. Quart. Journ. Geol. Soc. vol. xxiv. p. 472.

1868. **Lapparent**, A. **de**. Sur l'étage de la Gaize. Bull. Soc. Géol. de France, 2e sér. t. xxv. p. 869.

1868. **Keeping**, H. Discovery of Gault with Phosphatic Stratum at Upware. Geol. Mag. vol. v. p. 272.

1868. **De Rance**, C. E., F.G.S., of the Geological Survey. Albian or Gault of Folkestone. Geol. Mag. vol. v. p. 163.

In this paper the author set himself systematically to work to describe the Gault. He was the first to divide it into two parts, the Upper and Lower, and to subdivide the whole into eleven more or less well-marked zones or beds. To these beds provisional names were assigned, expressive either of their colour, position, or palæontological characteristics, to which he affixed numbers, commencing with bed xi., the junction-bed of the Gault and Upper Neocomian, or Folkstone Beds.

This is an original and valuable idea, and especially calculated to help the geologist who is bent upon collecting fossils stratigraphically, as, when a specimen is found, what can be simpler than to scratch the number of the bed upon it in Roman numerals?

It is, as you are all aware, next to useless to collect fossils indiscriminately. Care should always be taken to mark the horizon whence they are obtained.

1869. **Wiltshire**, Rev. **Thomas**, F.G.S. Red Chalk of Hunstanton. Quart. Journ. Geol. Soc. vol. xxv. p. 185.

In it the author gives a full description of Hunstanton Cliff. This Red Chalk, palæontologically, is equivalent to the Upper Gault. Mr. Wiltshire states that the red bands of Hunstanton agree in position with the Norfolk Gault, as being below the Chalk and above the Carstone, and that the presence of iron brings them into concord with the Gault of Kent. It would appear that the Red Chalk is the representative of the upper portion of the typical English Gault.

1869. **Davidson, Thomas.** Notes on Continental Geology. Geol. Mag. vol. vi. p. 259.

1872. **Bonney**, Rev. T. G. On Upper Greensand or Chloritic Marl of Cambridgeshire. Geol. Assoc., Feb. 1872.

1872. **Topley, William**, F.G.S. The Agricultural Geology of the Weald. Royal Agricultural Society of England.

The author describes the agricultural value of the Gault. He states that its soil, known as "black land," is always stiff and hard to plough, but when drained it makes excellent land, perhaps as good as any in the south of England, except the Upper Greensand. A large portion of it is pasture; the middle is most productive, which contains the largest percentage of carbonate of lime, and is consequently valuable as manure.

1873. **Price**, F. G. H., F.G.S. On a new Species of *Rostellaria* from the Gault of Folkestone. Geol. Mag. vol. x. p. 97.

1873. **Gardner**, J. S., F.G.S. Notes on the Genus *Rostellaria* (or *Aporrhais*?) of the Gault. Ibid. p. 161.

1873. **Bonney**, Prof. T. G., F.G.S. On Upper Greensand or Chloritic Marl of Cambridgeshire. Proc. Geol. Assoc. vol. iii. no. 1, p. 1.

1873. **Topley, William**, F.G.S. On the Relation of the Parish Boundaries in the South-east of England to great physical features, particularly to the Chalk escarpment. Journ. Anthrop. Inst. vol. iii. p. 32.

1874. **Price**, F. G. H., F.G.S. On the Gault of Folkestone. Quart. Journ. Geol. Soc. vol. xxx. pp. 342–368.

The author describes the Gault of Folkestone, dividing it into eleven lithological beds. Appended are a list of fossils and a plate of new fossils.

1874. **Price**, F. G. H., F.G.S. On the Lower Greensand and Gault of Folkestone. Proc. Geol. Assoc. vol. iv. no. 2, pp. 135–150.

1874. **Barrois**, Dr. **Charles**. L'étage de la gaize dans le Boulonnais. Bull. Soc. Géol. de France, t. ii. p. 227.

1874. **Barrois**, Dr. **Charles**. Sur le Gault et sur les couches entre lesquelles il est compris dans le bassin de Paris. Published in the 'Annales de la Soc. Géologique du Nord,' 18 Nov. 1874.

Dr. Barrois considers that the top bed of the Upper Neocomian series, known in England as the zone of *Am. mammillaris,* the Aptien of D'Orbigny, is the base-bed of the Gault, and that bed ix. of my section is his zone of *Am. inflatus,* which he places in the Craie glauconieuse, the Cénomanien of D'Orbigny.

Thus Dr. Barrois divides the Gault into Upper and Lower; the Lower division he calls the zone of *Am. mammillaris*, and his Upper division the zone of *Am. interruptus.*

I am prepared to admit that the clays of the Gault become more and more marly after the nodule-bed is passed, and that it must have been deposited in deeper seas, as is proved by its fauna; but I am still of opinion that it is Gault for all that, and that the whole of the zone of *Am. inflatus*=*rostratus* is the Upper Gault.

1874. **Meyer**, C. J. A., F.G.S. On the Cretaceous Rocks of Beer Head, &c. Quart. Journ. Geol. Soc. vol. xxx. p. 369.

Mentions the Gault as occurring near Black Venn, likewise at Punfield, Swanage Bay. He observes it is traceable along the coast-line as far westwards as Mewps Bay.

1874. **De Rance**, C. E., F.G.S. On the Deposition of Cretaceous Strata in the South-west of England. Geol. Mag., June 1874.

1875. **Martin**, **Jules**. Des nodules phosphatés du Gault de la Côte d'Or, et des conditions particulières du dépôt de cet étage. Bull. Soc. Géol. France, 3^{e} sér. t. iii. pp. 273–281.

This paper contains a list of Gault fossils from the Côte d'Or.

1875. **Tombeck**. Note sur la présence du Gault à Montiérender (Haute-Marne). Bull. Soc. Géol. France, 3^{e} sér. t. iii. pp. 49, 50.

This states the fauna to be the same as at Folkestone and Wissant.

1875. **Price**, F. G. H., F.G.S. On the probable Depth of the Gault Sea. Proc. Geol. Assoc. vol. iv. no. 5, pp. 269–278.

In which the author endeavours to prove that the Gault of Folkestone was deposited in an area which sank more rapidly than the sediment accumulated. Thus the Lower Gault was a littoral shallow sea or estuarine deposit, gradually deepening to the Upper Gault, which was deeper, as is shown by the extinction of many Lower Gault forms and the incoming of genera whose representatives inhabit deep seas.

1875. **Barrois, Dr. Charles.** L'Aachénien et la limite entre le Jurassique et le Crétacé dans l'Aisne et les Ardennes. Bull. de la Soc. Géol. de France, 3e sér. t. iii. p. 257.

1875. **Barrois, Dr. Charles.** L'âge des Couches de Blackdown. Annales de la Soc. Géol. du Nord, t. iii. p. 1. Lille.

1875. **Carruthers, William,** Esq., F.R.S. Note on the Flora of the Gault, with Description of a new Pine cone. Proc. Geol. Assoc. vol. iv. p. 278.

1875. **Bonney,** Prof. T. G., F.R.S. Cambridgeshire Geology. Deighton: Cambridge.

1875. **Jones,** Prof. **Rupert,** F.R.S. Note on an Annelid Bed in the Gault of Kent. Geol. Mag. dec. ii. vol. iii. (March).

1875. **Topley, William,** F.G.S. The Geology of the Weald. Memoirs of the Geological Survey. London: Longmans & Co.

On pages 145 to 151 the author describes the Gault of the Wealden area. He admirably sets forth the lithological characteristics and depths to which the Gault has been found to attain.

1875. **Jukes-Browne,** A. J., F.G.S., of the Geological Survey. On the Relations of the Cambridge Gault and Greensand. Quart. Journ. Geol. Soc. vol. xxxi. pp. 256–316.

In which, after giving the stratigraphical relations of the Gault and Chalk Marl in Cambridgeshire and Bedfordshire, Gault and Upper Greensand in Bucks, Upper Gault in Bucks and Beds, Gault and Greensand of the Weald, and, secondly, the palæontological relations of the same, the author proved satisfactorily that the so-called Upper Greensand, or Coprolite bed, of Cambridgeshire was, in a great measure, the result of the denudation of the Upper Gault (beds x. and xi.), and part of the Chalk Marl, as shown by its *remanié* fauna.

Mr. Jukes-Browne supplies some interesting facts respecting the depths to which the Gault has attained, and which proves that, as far as Cambridgeshire is concerned, the Gault gradually diminished in thickness from west to east, as at Eddlesborough, where he gives it at 205 feet at Cambridge it is only 105, whilst at Norwich it thins out to 36 feet.

1875. **Barrois, Dr. Charles.** Le Gault dans le bassin de Paris. Bull. Soc. Géol. de France, 3e sér. t. iii. p. 707.

1875. **Gardner, J. Starkie,** F.G.S. On the Gault Aporrhaidæ. Geol. Mag. vol. ii. no. 2, pp. 49–56; vol. iii. pp. 126–130; vol. ii. pp. 198–203; no. 7, pp. 291–298; no. 9, pp. 394–400.

In which the author has thoroughly and systematically described the Gault Aporrhaidæ; many of the old and familiar species, and even genera, he has found to be wrong, and has renamed them. *Rostellaria*, for instance, a genus supposed to be common in the Gault, is now proved not to belong to that formation at all, but that it is a true *Aporrhais.* He has created new genera for some of the family, viz. *Dimorphosoma, Ornithopus,* and *Tridactylus.*

1876. **Gardner, J. Starkie,** F.G.S. Cretaceous Gasteropoda.—Scalidæ. Geol. Mag. vol. iii. pp. 75–78, 105–114, 160–163.

1876. **Delatour, Albert.** Sur le Gault des environs de Brienne (Aube). Bull. Soc. Géol. de France, 3e sér. t. v. p. 22.

1877. **Gardner, J. Starkie,** F.G.S. On British Cretaceous Patellidæ and other Families of Patelloid Gastropoda. Quart. Journ. Geol. Soc. vol. xxxiii. p. 192.

1877. **Gardner, J. Starkie,** F.G.S. Notes on Cretaceous Gasteropoda. Geol. Mag. dec. ii. vol. iv. p. 556.

1877. **Gardner, J. Starkie,** F.G.S. On the Cretaceous Dentalidæ. Quart. Journ. Geol. Soc. vol. xxxiv. p. 56.

1877. **Jukes-Browne, A. J.,** F.G.S. Supplementary Notes on the Fauna of the Cambridge Greensand. Quart. Journ. Geol. Soc. vol. xxxiii. p. 485.

1877. **Jukes-Browne, A. J.,** F.G.S. Notes on the Correlation of the Beds constituting the Upper Greensand and Chloritic Marl. Geol. Mag. dec. ii. vol. iv.

1878. **Dumont, A.** Mémoires sur la T. crétacé de la Belgique.

1878. **Barrois, Dr. Charles.** Mémoire sur le Terrain crétacé des Ardennes et des régions voisines. Lille, 1878.

1878. **Prestwich, Prof. J.,** F.R.S. On the Range of the Lower Greensand and Palæozoic Rocks under London. Quart. Journ. Geol. Soc. vol. xxxiv. p. 902.

1878. **Moore, Charles,** F.G.S. On the Palæontology of the Meuxwell Deposits. Quart. Journ. Geol. Soc. vol. xxxiv. p. 917.

1878. **De Rance, Charles E.,** F.G.S. On the Palæozoic and Secondary Rocks of England as a Source of Water-supply for Towns and Districts. Manchester Geol. Soc., March 26, 1878.

CHAPTER II.

At the commencement of the Cretaceous epoch the Gault sea occupied a very extensive area, extending in England from Folkestone in Kent in the south-east, skirting the line of what now is the Chalk escarpment, through the counties of Surrey, Sussex, Hampshire, Isle of Wight, parts of Dorsetshire, and then, taking a northerly or north-easterly direction through the Midland counties, outside the present boundary of the formation, through the present counties of Wiltshire, Berkshire, Oxfordshire, Buckinghamshire, Bedfordshire, Cambridgeshire, Norfolk, crossing the Wash into Lincolnshire and the East Riding of Yorkshire to Flamborough Head and Speeton, and occupying the whole of the rest of the site where the Eastern counties of England and the North Sea now are, into Westphalia and Belgium, thence round the axis of Artois to the North of France, washing the shores of Brittany, Normandy on the west, and extending back towards Dorsetshire. Thus it follows that the sea, whose waters flowed into the Gulf of Paris, to the west washed the Triassic and Jurassic cliffs of the Midland counties, and to the east its waves beat against the northern sides of the Monts Hercyniens.

The deposits which were first formed in this deep sea are covered by a considerable thickness of more recent formations, which can be studied along the outcrops in England and France. Dr. Barrois considers that these waters did not immediately flow into the Gulf of Paris, but had to pass through a strait. When the Cretaceous period commenced there was probably dry land in the neighbourhood of those areas where we now find the Wealden deposits; the sea consequently did not recover this region as it entered the Paris basin by the gap or opening comprised between the Wealden and the Jurassic formation of Wiltshire. This strait frequently oscillated between the state of dry land and that of shallow water during the early Cretaceous period. The Paris basin would be at this time a Caspian; but from time to time the sea made incursions over this barrier, and transformed it into a Mediterranean. There are proofs of this intermittent passage of the sea in the presence of the marine beds of Punfield, interpolated in the Neocomian of this strait.

The best sections of Gault now to be seen are notably Folkestone, Warminster, Devizes, Lyme Regis, Eastbourne, Cambridge, &c., and in France in the departments of the Aube, Ardennes, Yonne, &c., and at Wissant in the Pas-de-Calais.

All round the margin of the Weald it crops out, and passes beneath the Channel at Folkestone on the east side and Eastbourne on the west, to again appear at Wissant, skirting the Chalk escarpment in the Pas-de-Calais, stretching all round that district to Neufchatel on the south-east. At the base of the Chalk the Gault valley presents much the same characters as in the Weald, but of less width.

It is likewise met with in deep-well sections in Middlesex: for instance the nodular beds at the base of the Gault were reached at a depth of 999 feet from the surface at Meux's brewery, where it was found to be 160 feet thick; at Kentish Town 130½ feet thick, and at Crossness 176 feet thick. (See Appendix on Well-sections.)

It may be inferred from physical, as well as from biological evidence, that the Gault was deposited in a sinking area, and that the sea of the time was highly charged with sediment, caused by the denudation of the land and by the action of the sea against the coast-line. As all the fossils are so well preserved, they have doubtless been speedily covered by the sediment as it accumulated upon the floor of the Gault sea; and the area sank more rapidly than the *detritus* accumulated, whereby the actual sea-bed was deepened.

I presume that the floor was composed of soft mud, and that, as the animals fell upon it, they were not suffered to roll about and become comminuted, but were gradually buried in the sediment. Had it been otherwise, the fossils would appear, rolled as they are, in the lines of nodules.

I would suggest that these lines of nodules, mixed as they are with rolled fossils, occurring so plentifully throughout the deposit, mark the floor of the sea during a period, more or less vast, when great physical changes may have altered the course of the currents, and so borne away the sediment, to be redeposited in another direction; or they may represent periods of upheaval or tranquillity, when the sea-bed was at rest. It may thus be argued that these nodule-beds, not exceeding 1 inch in thickness, are equivalent to a period of time far greater than was required for the deposition of several feet of the clay. Thus the nodule-bed No. VIII. of the Folkestone section would represent a very vast period, from the circumstance of about 100 species of Mollusca, chiefly Siphonostomata, of the Lower Gault becoming extinct.

The beds of the Lower Gault were a near-shore deposit, gradually becoming deeper from bed I., or the zone of *Ammonites interruptus*, as we approach the higher beds. Thus, in course of time, as the sea-bed gradually sank, so did that sea naturally become deeper and deeper, as may be proved by the extermination of the littoral and laminarian forms of life, and by the incoming of genera which denote deeper seas.

From the same evidence it may be inferred that the Upper Gault sea must have been of long duration, and that it extended all over what is now the southern and eastern counties of England, and over what is occupied by the south-east portion of the British Channel, extending across the Bas-Boulonnais and the Paris basin.

It has been suggested* that the Cambridge phosphate-beds are due to cold northerly currents. Many Crustacea are found to be contemporary with the lines of nodules in the Gault. The cold-current theory may probably be correct, as in the North Atlantic at the present day crustaceans are found to be most numerous in the cold-water areas.

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* See Sollas and Jukes-Browne, "On the Included Rock-fragments of the Cambridge Upper Greensand," Quart. Journ. Geol. Soc. vol. xxix. p. 14.

CHAPTER III.

The Gault of Folkestone being the typical formation, I shall proceed to describe the section at Copt Point in detail.

It is a matter of difference of opinion between English and French geologists as to where the Folkestone beds of the Upper Neocomian end, and where the Gault begins; it is usual amongst the latter to place the *Ammonites-mammillaris* zone in the Gault, as it contains so many fossils belonging to the Gault in a coarse gritty matrix of Upper Neocomian. In respect to this bed I do not agree with the French geologists, as I consider that particular zone to be the topmost bed of the Folkestone beds.

I therefore commence the Gault with the first line of phosphatic nodules, which occur immediately above the *Am.-mammillaris* zone.

The Gault is divided into two divisions, Upper and Lower, separated by a passage- or junction-bed; and these divisions are again subdivided into eleven well-marked zones, to which numbers are attached for convenience, and each band has a provisional name assigned to it, indicative of either its colour or fossil contents.

The total thickness of this formation at Copt Point is 99 feet 4 inches. Copt Point is 130 feet above the sea-level.

As many species, more especially *Ammonites*, are peculiar to restricted zones, which constitute horizons, I take this opportunity of urging all geologists to the necessity of collecting fossils systematically, and of carefully noting the horizons from which they are obtained.

It therefore behoves all geologists to avoid collecting indiscriminately, and thereby destroy landmarks which might prove so useful to others.

As regards the Gault, the various zones being numbered, it will be found convenient for geologists to adopt the course of scratching the number of the bed on the specimen whilst collecting, which system will be found most beneficial*.

Copt Point Section, Folkestone.

Bed I.

Commences with a line of nodules of sulphuret of iron, which is about 1 foot 3 inches in thickness, succeeded by a band of dark greensand, containing two lines of phosphatic nodules, in which *Ammonites interruptus* occurs frequently; from the fact of its being so numerous in this horizon, both at Copt Point and wherever this bed of the Gault is found, I have called this bed the zone of *Ammonites interruptus*. Many other fossils, mostly in the form of rolled casts, occur in it, many of which are covered with small crystals

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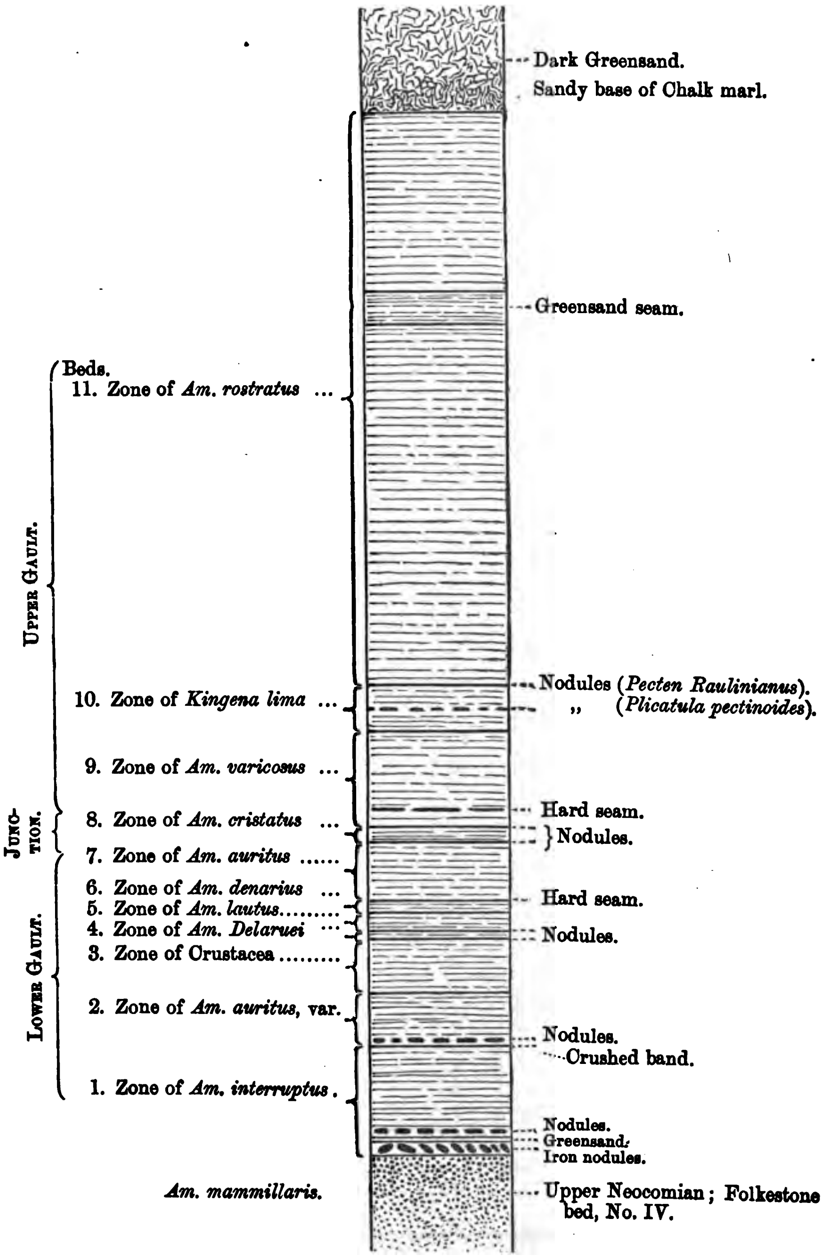
* The substance of this chapter, "On the Gault of Folkstone," was read before the Geological Society (see Quart. Journ. Geol. Soc. 1874, vol. xxx. p. 342 *et seq.*), to which the author has added much that is new.

Diagram Section of the Gault at Copt Point.


Dark Greensand.
Sandy base of Chalk marl.
Greensand seam.
Beds.
11. Zone of Am. rostratus ...
Upper Gault.
10. Zone of Kingena lima ...
Nodules (Pecten Raulinianus).
" (Plicatula pectinoides).
9. Zone of Am. varicosus ...
8. Zone of Am. cristatus ...
Hard seam.
Junction.
} Nodules.
7. Zone of Am. auritus ......
6. Zone of Am. denarius ...
Hard seam.
5. Zone of Am. lautus.........
4. Zone of Am. Delaruei ...
Nodules.
3. Zone of Crustacea ....
Lower Gault.
2. Zone of Am. auritus, var.
Nodules.
Crushed band.
1. Zone of Am. interruptus.
Nodules.
Greensand.
Iron nodules.
Am. mammillaris.
Upper Neocomian; Folkestone bed, No. IV.

(Scale 18 feet to 1 inch.)

Table of Beds of the Gault at Folkstone.

No. of Bed.	Nature of Bed.	Measured from	Measured up to the	Thickness of Beds.		Zones.	Characteristic Fossils.
				feet	in.		
XI.	Pale, cold grey marl, with a seam of greensand 3 feet 3 in. thick running through it.	A line of nodules containing *Pecten Raulinianus.*	Sandy base of Chalk Marl.	56	3	*Ammonites rostratus.*	*Inoceramus Crispii, Pecten Raulinianus, Ammonites Goodhallii, A. rostratus, A. varians.*
X.	Hard marl of a pale grey colour.	The crushed band of *Inoceramus sulcatus.*	Line of nodules containing *Pecten Raulinianus.*	5	1	*Kingena lima.*	*Cidaris gaultina, Hemiaster minimus, Kingena lima, Terebratula biplicata, Pentacrinus Fittoni, Plicatula pectinoides, Ammonites rostratus.*
IX.	Pale grey marly clay.	Second line of nodules in bed VIII.	*Inoceramus-sulcatus* cast-bed.	9	4½	*Ammonites varicosus.*	*Inoceramus sulcatus, I. subsulcatus, Ammonites varicosus, A. rostratus.*
VIII.	Clay darker than above, containing two lines of nodules and *remanié* fossils.	First line of nodules at the top of bed VII.	Second line of nodules.	0	9½	*Ammonites cristatus.*	*Pholas sanctæ crucis, Mytilus Galliennei, Cucullæa glabra, Cyprina quadrata, Ammonites Beudanti, A. cristatus.*
VII.	Dark clay, highly fossiliferous.	Hard seam at top of bed VI.	First line of nodules.	6	2	*Ammonites auritus.*	*Nucula bivirgata, N. ornatissima, Aporrhais Parkinsoni, Fusus indecisus, Pteroceras bicarinatum.*

VI.	Mottled with lightish marking on dark clay.	Top of coral-bed V.	Hard seam, top of bed.	1	0	*Ammonites denarius.*	*Necrocarcinus Bechei*, *Turrilites Hugardianus*, *Ammonites cornutus* (small var.), *A. denarius.*
V.	Spotted with light markings on darkish ground.	Line of nodules containing rolled casts in phosphate.	Line where the clay becomes more mottled.	1	6	*Ammonites lautus.*	*Smilotrochus elongatus*, *S. insignis*, *Solarium moniliferum*, *Phasianella ervyna*, *Ammonites lautus.*
IV.	Slightly lighter than the above, not mottled.	Line of nodules, with backs of crabs &c.	Line of phosphatic nodules and rolled casts.	0	4	*Ammonites Delaruei.*	*Natica obliqua*, *Dentalium decussatum*, *Fusus gaultinus*, *Ammonites Delaruei*, *Avellana pulchella.*
III.	Light fawn-coloured clay.	Top of black bed II.	Line of nodules? containing backs of crabs &c.	4	6	Crustaceans.	*Palæocorystes Stokesii*, *P. Broderipii*, *Leda* allied to *solea*, *Pinna tetragona*, *Hamites attenuatus.*
II.	Very dark clay; fossils bearing high colours.	Band of crushed fossils above the zone of *Ammonites interruptus.*	Base of light bed III.	4	3	*Ammonites auritus*, var.	*Pollicipes rigidus*, *Pectunculus*, *Lucina tenera*, *Corbula gaultina*, *Arca nana*, *Nucula pectinata*, *Cerithium trimonile*, *Fusus Itierianus*, *Aporrhais calcarata*, *Ammonites auritus*, var.
I.	Dark clay, dark greensand, and iron nodules.	Nodules of sulphuret of iron, top of Neocomian beds.	Band of crushed fossils &c.	10	1	*Ammonites interruptus.*	*Ammonites interruptus*, *Crioceras Astierianum*, *Hamites rotundus.*
			Total thickness…………	99	4		
		Upper Neocomian……………	Folkestone beds……………………			*Ammonites mammillaris.*	

of selenite, which I have never observed on fossils from the other beds. The dark greensand seam goes suddenly off in black clay, with a line of phosphatic nodules traversing it. These nodules of phosphate of lime arise, I presume, from the decomposition of the remains of mollusca, fish, saurians, &c.

This bed was, no doubt, deposited in a shallow sea, formed quite near to shore, as is indicated by the presence of fossils belonging to the littoral zone.

Upon many fragments of *Ammonites*, mostly of *interruptus*, I have found specimens of *Plicatula pectinoides*, *Janira quinquecostatus*, *Trochosmilia sulcata*, and a *Nucula*, all having the shell on, apparently indicating that they were contemporaneous with the formation of the bed.

These rolled fossils are possibly derived species, and were fossils before the formation of this deposit. The sea-bed then began to sink, since we find a seam of greensand coming on, which gradually goes off into clay, and many littoral and shallow-sea forms make their appearance; or it might have been a muddy estuary rather than an actual shore, or if not an estuary, a mud bank some little way off land.

The thickness of bed I. measured up to a hard seam of nodules and crushed band of fossils is 10 feet 1 inch.

Bed II.

This bed is measured from the crushed band of fossils, which is 1 inch thick, having a line of phosphatic nodules running through it.

The clay of this bed is of a very dark colour, in fact very nearly approaching to black when moist, and is somewhat hard. It is remarkable for the deep rich colour of its fossils, and for its containing several species peculiar to it.

The rich colour on the shells of the fossils from this zone is, no doubt, due to the very large percentage of iron in the form of oxides, and to the comparatively small percentage of carbonate of lime met with in the clay of this bed.

Mr. W. H. Hudleston, F.G.S., has given me the following analysis of the clay of this bed:—

“ The Gault of this zone consists of a grey marly clay; constituent particles extremely fine and close; nothing granular observed except a few specks of pyrites and a considerable amount of organic matter.

“ Dried at 100° C. it contains:—

		per cent.
	Water and organic matter	8·25
	Carbonate of lime	8·61
	Silica, silicates, oxides of iron *, pyrites &c.	81·93
Not actually estimated.	Chloride of sodium (consid.)	1·21
	Carbonate of magnesia (traces)	
	Sulphuric acid	
	Phosphoric acid (traces)	
		100·00

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* Metallic iron 4·25 per cent.

"This differs principally from the upper bed (*i. e.* bed XI.) in containing less carbonate of lime and less phosphoric acid, but much more iron and more organic matter."

Just above the crushed band, John Griffith has recently discovered at Copt Point the skeleton (nearly entire vertebræ) of *Mauisaurus Gardneri*, which he estimates must be fully 12 feet in length. As all the bones were found spread out in one horizon, there is not much doubt that the head will be met with, which will settle the species. In connexion with these bones about a quart of rolled and smooth-surfaced quartz pebbles were found, evidently from the stomach of the animal, as it is extremely rare to find a pebble in the Gault at all. It is my opinion that all the pebbles hitherto found in the Gault have been swallowed by some large fish or saurian.

At a distance of three inches upwards from the last-named band a line of selenite in large pieces occurs; this mineral is not met with in any other part of the Gault, and only in the position here indicated in bed II.

One foot above the selenite a line of phosphatic nodules occurs; the space between these two is the horizon of *Aporrhais calcarata*, D'Orb. (*Dimorphosoma calcarata* of Gardner [*]), which beautiful little gastropod is not met with elsewhere in the Gault. It is common at Blackdown. *Turrilites elegans* and *Ancyloceras spinigerum* likewise occur in this horizon, and are not again seen.

The following species are peculiar to this bed:—

Fusus Itierianus, *D'Orb.*
Cerithium trimonile, *Mich.*
Narica cancellata, *Chemn.*
Corbula gaultina, *Pict. & Camp.*
Myacites, sp.
Pectunculus, sp.
Nucula De Rancei, *Price.*
Pollicipes rigida, *Sow.*

and a variety of *Am. auritus*, having long tubercles, which may perhaps be a distinct species.

The total thickness of this bed, measured up to the base of the "light bed," No. III., is 4 feet 2 inches.

Bed III.

Known as the "light bed," or "crab-bed," from the fact of many of the Crustaceans found in the Gault being derived from it.

It may be readily recognized from any other by its light fawn-coloured clay, which exhibits a striking contrast to the very dark colour of the bed last described.

Its thickness is 4 feet 6 inches, being measured from the top of bed II. to a line of nodules containing many rolled fossils with the shells preserved on them, carapaces of *Palæocorystes Stokesii* and *P. Broderipii*, *Hamites*, and bones of saurians and fishes.

A remarkably fine type of *Inoceramus concentricus* occurs in this line of nodules.

Tabular masses of ironstone occur in various parts of this bed, being of the same light fawn-colour as the clay. Similar ironstone also occurs in bed V., which is perforated throughout by some small boring mollusk; it likewise contains many species of Foraminifera. Prof. Rupert Jones has found the same bed at Westwell Leacon, near Charing, Kent. It contains many of the fossils common to the bed, *Corbula elegans* being met with in it in large numbers.

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[*] "On Gault Aporrhaidæ," Geol. Mag. dec. 2, vol. iii. p. 128.

For the following analysis of this ironstone I am indebted to Mr. W. H. Hudleston:—

" A clay ironstone free from grit. The bulk of the mass consists of pulverulent carbonate of lime, ferrous carbonate, extremely fine particles of clay &c., with about 2 per cent. of pyrites. Dried at 100° C.:—

" Amount of metallic iron (principally as protoxide) ..	29·40
" Add for iron in combination with sulphur (say)	1·00
" Total metallic iron	30·40 "

Bed IV.

This is a narrow band, which was apparently overlooked by Mr. De Rance, or not considered by him of sufficient importance to be constituted into a separate bed. It is measured from the line of nodules containing the carapaces of Crustaceans before named to a line of phosphatic nodules and rolled casts of fossils. Imbedded in many of the fragments of phosphate a very small species of *Hoploparia* is met with, which species is not found in any other part of the Gault.

The total thickness of this bed is 4 inches; in colour it is slightly darker than the preceding bed No. III., and is not mottled like the clay of bed No. V.

Comparatively few fossils are met with in this bed; the following may be regarded as peculiar to it:—

Ammonites Delaruei, D'Orb., a form belonging to the group *Cristati*, which may be considered characteristic of the Upper Gault, as the groups *Dentati* and *Tuberculati* are of the Lower. *Ammonites cornutus*, Pictet, and *Ammonites Roissyanus*, D'Orb., are the only other forms belonging to the group *Cristati* that I have met with in the Lower Gault; and as only these three forms have been found in the Lower Gault, the *Cristati* group of *Ammonites* may still be considered characteristic of the Upper division.

An Ammonite possessed of very long spines or tubercles, which may be classed as a variety of *Ammonites tuberculatus*, Sow., M. C.; a small species of *Natica*, which was described by me as *Natica obliqua* *; and *Fusus gaultinus*.

The conditions under which this bed was formed appear to have been especially favourable to the development of *Dentalium decussatum*, remarkably fine specimens of which occur between these lines of nodules.

I submitted one of the nodules from the last-described band (in fact one containing a specimen of the small *Hoploparia*) to my friend Mr. Hudleston, who has reported to me the following results:—

" This is a mixture of carbonate of lime with phosphate of lime and iron, some clay, organic matter, and pyrites.

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* Q. J. G. S. 1874, vol. xxx. p. 356.

"The amount of phosphoric anhydride in the sample dried at 100° C. is

25·53 per cent. = 55·60 tricalcic phosphate."

Bed V.

This bed may consistently be termed the "coral-bed," on account of the quantity of corals which it contains.

Its thickness is 1 foot 6 inches. The clay is of a dark colour, spotted to within a few inches of the top with light fawn-coloured markings.

It is measured from the line of nodules containing the fossil casts up to a line where the clay becomes more strongly mottled.

This bed is considered by Mr. De Rance to be the zone of *Nautilus Clementinus*; but as that fossil is by no means peculiar to it, and makes its first appearance in bed III., and has been met with in every bed up to and in bed XI., I do not think we can specialize it as the zone of *Nautilus Clementinus,* but rather as the zone of *Ammonites lautus,* as the typical form of this species makes its first appearance in it.

The following fossils appear to be peculiar to this bed:—

Astarte Dupiniana, *D'Orb.*
Funis cancellatus.
Turritella, two sp. undetermined.
Solarium albense, *D'Orb.*
—— moniliferum, *Mich.*

The following eight forms make their first appearance in this bed:—

Cardita rotundata, *Pictet.*
Nucula Vibrayeana, *D'Orb.*
Avellana inflata, *D'Orb.*
Bellerophina minuta, *Sow., M. C.*
Solarium conoideum, *Sow.*
Phasianella Ervyna, *D'Orb.*

Resin is also found in this bed; Mr. Hudleston tells me such substances, like the Highgate resin, are viewed by Dana as a kind of copalite. This resin is wholly volatile, burning with a highly luminous flame and fragrant odour; it is not appreciably soluble in alcohol.

Bed VI.

This bed, commonly styled the "mottled bed," is of small vertical thickness, being only one foot. It is measured from the top of bed V. to a hard seam. The clay is darker than that of the preceding bed, and is mottled throughout with lightish-coloured markings.

It may be considered the zone of *Ammonites denarius*, Sow., M.C., as that fossil is frequently met with in it and is of rare occurrence in any other bed. The following forms are peculiar to this zone:—

Fusus elegans, *D'Orb.*
Rissoina Sowerbii, *Gardner.*
Turrilites Hugardianus, *D'Orb.*
Ammonites cornutus, *Pictet* (a small variety).

Bed VII.

The top bed of the Lower Gault is measured from the hard seam constituting the limit of bed VI. up to the first line of nodules forming the base of the Junction-bed. It is 6 feet 2 inches in thickness, and is usually called the "dark bed," from its very dark colour, although it is not so dark as bed II., neither do the fossils bear so rich a colour as they do in the latter.

This bed is highly fossiliferous, containing as many as 67 species. It is especially rich in Gastropoda, and possesses six species peculiar to it, namely:—

Nucula albensis, *D'Orb.*
Aporrhais Parkinsoni, *Sow.*
Fusus indecisus, *D'Orb.*
Avellana Dupiniana?, *D' Orb.*
Cerithium Phillipsi?, *Leym.*

There are likewise three well-marked forms, which make their first appearance and are abundant in this bed, and pass up into the Junction-bed above, where they only occur sparsely. These are:—

Nucula bivirgata, *Sow.?*
—— ornatissima, *D'Orb.*
Buccinum gaultinum, *D'Orb.*

Of the last-named fossil I have thought it well to give figures in a previous paper*, as that given by D'Orbigny in his 'Paléontologie Française,' tom. ii. pl. 233, is of so fragmentary a character as to be difficult to identify with the fine specimens met with in this bed.

Ammonites auritus and a variety of the same occur in large quantities, from which circumstance it may be well to describe this as the zone of *Ammonites auritus.*

The genus *Cerithium* is well represented in the Lower Division, in which (ranging from bed No. II. up to this bed) as many as 16 different species have been met with. Of these 10 appear not to have been described. I have only enumerated 10 species in my Table (*l. c.* p. 361); of the remaining six I have only found single specimens, and have therefore deferred noting them until more data shall have been obtained. This group will form an excellent subject for a monograph at a future time.

Bed VIII.

This constitutes the Junction-bed or "passage" between the Upper and Lower Gault, and is measured from the first line of nodules before cited as forming the top of bed VII. to a second line of nodules. It has a total thickness of 10 inches, and is well known by the name of the "nodule-bed."

This passage-bed, for such it really is, contains many species belonging to both the Upper and Lower Gault, and marks the total extinction of many Lower Gault forms, no less than the introduction of others which took their place.

Few species of Gastropoda, which are so plentiful in the top beds of the lower division, pass into this Junction-bed; they are here generally found in the form of casts or much enveloped in phosphate; those that are met with in the Upper Gault are chiefly Holostomes, as most of the Siphonostomata become extinct in this bed, with the exception of a few species of *Aporrhais*. Several Ammonites belonging to the various groups are found here. The characteristic species is *Ammonites Beudanti*, which is not found in any other part of the Gault. It may be well to mention that this well-marked form obtains largely in the zone of *Ammonites mammillaris* in the Upper Neocomian or Folkestone beds of the Lower Greensand.

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* See "Gault of Folkestone," Quart. Journ. Geol. Soc. 1874, vol. xxx. p. 349, pl. xxv. figs. 1, 2.

The nodules of this zone, like the nodules at the base of the Gault in bed I., contain for the most part a *remanié* group of fossils.

The Lower Gault appears to have been especially favourable to the life and development of the Gastropoda; for as many as 54 species have been obtained from those beds; and they reached their maximum of development in bed VII. Eleven of these species extend into the nodule-bed No. VIII., there being but two species peculiar to it.

Out of the 17 species of Gastropoda found in the Upper Gault, 14 appear to have survived from the Lower, and 5 are peculiar to the Upper, thus showing that the conditions of the Upper Gault sea were unfavourable to the continuance of the more delicate forms of life, or, if they were continued, that the chemical constituents of the sediments deposited during the formation of these marls were unfavourable to the preservation of specimens.

Out of 85 species of Lamellibranchiata that I have met with in the whole deposit, 45 become extinct in the lower division, or in bed VIII., 5 are peculiar to that bed and 18 to the Upper Gault, whereas only 19 species are continued from the lower beds.

Taking the whole of the fauna of the Gault, of which I have collected as many as 292 species, marking their particular horizon in the Table of genera and species in a former paper*, it will be seen that 124 forms become extinct in bed No. VIII., and 46 forms are continued into the Upper Gault. Bed VIII., besides containing the limit-fauua, possesses as many as 20 species which are peculiar to it. 57 new forms occur in the Upper Gault, making their first appearance either in No. VIII. or in a higher zone.

The following is a list of fossils which may be considered peculiar to bed VIII.:—

Bathycyathus Sowerbyi, *Edw. & H.*
Vermicularia, sp.
Avicula, sp.
Cucullæa glabra, *Park.*
Cyprina quadrata, *D'Orb.*
Mytilus Galliennei, *D'Orb.*
Pholas, n, sp.
—— Rhodani, *Pict. et Camp.*
Scalaria gaultina, *D'Orb.*
Murex calcar, *Sow.*
Ammonites splendens, *Sow.* (a variety).
—— Beudanti, *Brongn.*
—— Brongniartianus ?, *Pictet.*
—— Itierianus, *D'Orb.*
—— Selliguinus, *Brongn.*
Pachyrhizodus glyphodus, *Blake & Mackie.*
Ptychodus, sp.
Fish-jaw and fish-teeth, undescribed.

In addition to the above a variety of *Ammonites tuberculatus*, Sow., is met with.

This bed may be considered the zone of *Ammonites cristatus.*

* Quart. Journ. Geol. Soc. vol. xxx. p. 358.

Bed IX.

This bed, forming the base of the Upper Gault, is measured from the line of nodules at the top of the last-described bed to a line of nodules containing vast quantities of crushed forms of *Inoceramus sulcatus*; its total thickness is 9 feet 4½ inches.

Inoceramus sulcatus is the most characteristic fossil of this bed, which is everywhere marked with its silvery impressions. This species has never been met with in the Lower Gault at all, with the exception of a rolled cast recorded * as being found by Mr. Etheridge some years ago in the Junction-bed I. In the middle Junction-bed, No. VIII., it appears frequently, and occurs in good condition; but it reaches its maximum of development in the bed now under consideration, beyond which it does not pass. At a distance of one foot above the nodule-bed there occurs a seam of very hard marly Gault, which is filled with specimens of this fossil.

A hybrid form of this *Inoceramus* is met with in this zone, half of the shell resembling *I. sulcatus* and half *I. concentricus*. It was named *Inoceramus subsulcatus* by the Rev. Thomas Wiltshire †, and is figured by Pictet et Roux, Grès Verts, pl. 42. fig. 1.

Ammonites varicosus, Sow., is another fossil met with in great abundance in this zone, and is decidedly the characteristic Ammonite of the bed; it makes its first appearance in the line of nodules below, and passes up into bed X., where, however, it is not frequently found. I would suggest that bed IX. be considered the zone of *Ammonites varicosus*.

The geologist will at all times when working in the Gault readily be able to fix his position, and know that when he discovers these two most characteristic fossils he is upon the base of the Upper Gault.

A variety of *Ammonites lautus* occurs in this zone, ranging from the nodule-bed, where it is found in the form of casts, up to a hard seam near the top, but never having been noted as passing above that horizon. This Ammonite, belonging to the group *Dentati*, forms another exception to the rule of the Upper Gault being restricted exclusively to Ammonites of the group *Cristati*.

Just below the hard seam at the top of this zone, *Ammonites rostratus*, Sow., = *Ammonites inflatus* of D'Orbigny, makes its first appearance. It extends thence up to the top of the Gault.

Pholadomya fabrina, D'Orb., is only met with *in situ* in this bed; it certainly is found in the nodule-bed No. VIII., but then only in the form of rolled casts. No other fossils, so far as I have as yet been able to ascertain, can be considered to be peculiar to this zone;

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* Memoirs of the Geological Survey, 'The Geology of the Country between Folkestone and Rye.'

† "On the Chalk of Hunstanton," by the Rev. Thomas Wiltshire. Quart. Journ. Geol. Soc. vol. xxv. p. 190 (1869).

but the three following well-known Upper Gault forms make their first appearance in it:—

Pleurotomaria Gibbsii, *Sow.*, *M. C.*	Scaphites æqualis, *Sow.*
Avicula Rauliniana, *D'Orb.*	

Bed X.

Commences at the crushed band of *Inoceramus sulcatus*, and extends upwards to a line of phosphatic nodules containing specimens of *Pecten Raulinianus*, D'Orb., 5 feet 1 inch above the top of bed IX.

The Gault of this zone is homogeneous, hard, and of a pale cold grey colour, poor in organic remains, and partakes more of the character of marl than clay, as does the whole of the Gault of the upper division, which contains as much as 26 per cent. of carbonate of lime—a fact sufficient of itself to account for the shells of the fossils being so seldom preserved.

At a distance of 2 feet 8 inches above bed IX. a line of phosphatic nodules is met with, in which *Plicatula pectinoides* occurs in good condition and in large quantities.

At the base of this bed *Aporrhais maxima* *, the largest known *Aporrhais* from the Gault, was procured.

Between the last-mentioned seam of phosphatic nodules and the line of nodules containing *Pecten Raulinianus*, forming the base of bed XI., the clay, which has a thickness of 2 feet 5 inches, is much mottled. *Pentacrinus Fittoni* occurs in masses, whereas in all other parts of the Gault it is only found in fragments. *Cidaris gaultina* is only met with between these two lines of nodules.

Many pieces of bones of Chelonians and fishes are obtained from the same horizon.

In this bed X. *Pinnites Pricei*, Carr., was found.

Mr. Carruthers described before the Geologists' Association (vol. iv. p. 278) two species of *Sequoia*, and associated with them some species of *Pinus*, two of which were to be referred to a group of that genus at present found associated with two existing species of *Sequoia* on the mountains of North America.

These *Sequoiæ* from the Gault are the oldest known representatives of the genus; and it is remarkable that they should be thus early associated with species of the same group of Pines which is now represented only in the same country where the *Sequoiæ* also grow.

Upon two separate occasions Griffiths has discovered in this zone, between the two lines of nodules, crushed bodies which have been supposed by some to be the eggs of a species of turtle; they are more or less round, possessing the texture of egg-shells. Mr. J. S. Gardner has two specimens in his collection; and I have one, which I showed to Mr. J. W. Hulke, who reported that he did not think it was a Chelonian egg at all, but that of a crocodile, and that in the coarse pitting of the shell it most resembles that of *Crocodilus biporcatus.*

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* See Geol. Mag., March 1873, vol. x. pl. vi.

The following fossils may be considered peculiar to this bed:—

Goniaster, sp.	Hinnites, sp.
Kingena lima, *D'Orb.*	

Many teeth and dorsal spines of *Hybodus*, and teeth of *Otodus appendiculatus*, are found in it.

From the frequency of occurrence of *Kingena lima*, D'Orb., in this zone, I adopt the conclusion arrived at by Mr. De Rance*, and propose to name the bed the zone of *Kingena lima.*

Bed XI.

This bed consists of a marl of a cold pale grey colour, traversed by a series of partings, the smooth portions between which are coated over with a smear of oxide of iron. Some difficulty was experienced in finding the whole of this bed *in situ*, though equal in thickness to more than half the Gault. We therefore measured from the seam of phosphatic nodules containing *Pecten Raulinianus*, the base of bed XI., up to the base of the dark greensand seam which traverses this bed, and found that it had a thickness of 35 feet 6 inches. This measurement was taken in that part of Eastweir Bay, eastward of Copt Point, known as the Pelter.

As the upper portion of the greensand seam was wanting at this point, it having slipped off together with the upper part of the bed, we went slightly to the east of Copt Point, and southwards of Martello Tower No. 3, where the top of the Gault is *in situ*, capped by the Upper Greensand. We found the base of the greensand seam by excavating a trench down the cliff-side; we then took measurements of this seam (which, I may mention, Griffiths calls the "Middle Greensand," by no means an inappropriate term), and found that it had a thickness of 3 feet 3 inches. From the top of this seam to the base of the Upper Greensand was found to measure 17 feet 6 inches, thus giving a thickness of 56 feet 3 inches for bed XI., and a total thickness for the whole deposit of 99 feet 4 inches.

In this greensand large quantities of nodules occur in lines, which may be pyriform sponges; also a small species of *Inoceramus* (perhaps a young form of *concentricus*), *Aporrhais Orbignyana*, *Trochocyathus conulus*, *Pecten orbicularis*, *Belemnites ultimus*, *Ammonites Goodhalli*, *Plicatula pectinoides*, Sow., *Solarium ornatum*, Sow., *Avicula gryphæoides*, *Pollicipes* ——?, and *Plicatula sigillina*, fixed to Ammonites, an Ammonite allied to *A. lautus*, *Drepanephorus canaliculatus*, *Ichthyosaurus campylodon*, &c.

The Gault immediately above this greensand seam is of the same marly character as that below, only much mixed with grains of sand for the first few feet.

The bed No. XI. contains but few fossils which are entitled to be regarded as peculiar to it. They are as follows:—*Ostrea frons*; *Ptychoceras*; *Hylospongia* of Sollas, only met with just below the greensand seam; *Inoceramus Crispii*, a large smooth species; and *Ammonites varians*?, occurring above the greensand seam.

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* See Geol. Mag. 1868, vol. v. p. 163.

Ammonites rostratus is found of large size in this zone, often having *Plicatula sigillina* adhering to it. I have frequently met with this Ammonite measuring as much as 12 inches in diameter. *Ammonites Goodhalli* likewise attains a very large diameter.

Belemnites are rarely found at all above the greensand seam.

For the following analysis of the Gault of bed XI. I am indebted to Mr. W. H. Hudleston, who has taken considerable time and trouble in working it out for me.

" It consists of a pale grey marl, the particles in a minute state of subdivision. The bulk of the mass is a mixture of chalk and clay; a very few, and extremely small, quartz grains, and, after treatment with acid, one or two translucent greenish grains were observed; also small crystals and fragments of pyrites.

" Dried at 100° C. this sample contains:—

		per cent.
" Water and organic matter		6·75
Carbonate of lime		26·45
Clay-sand and silica, oxides of iron, pyrites, &c.		65·95
Chloride of sodium Sulphate of lime Carbonate of magnesia	found, but not estimated	·81
Phosphoric acid		·04
		100·00

Metallic iron 2·55 per cent."

At Folkestone the class Brachiopoda has been found to be confined to Upper Gault entirely, *Terebratula biplicata* first appearing in a rolled form in the zone of *Ammonites cristatus*, and continuing upwards through several beds; it is, however, most abundant in the zones of *Ammonites varicosus* and *Kingena lima*.

It appears to me to be remarkable that *Rhynchonella* has not been met with in the Folkestone Gault; and I cannot directly ascertain where any specimens of that genus have been met with in the Folkstone beds of the Upper Neocomian. Only one species appears to have been described from the Red Chalk of Hunstanton, and that is the *Rhynchonella sulcata* (Park.), which occurs in large quantities in the Sandgate beds of the Upper Neocomian, near Folkestone Harbour, both embedded in the sands and in masses agglutinated together with iron pyrites, this particular zone being No. 1 of my section [*]. No species of this genus is met with in this area from this zone upwards till we reach the Chalk Marl, where it again obtains, missing the Gault. A few specimens of *Rhynchonella Mantelliana* have recently been found in bed XI. (near the top) of the Gault at Eastbourne.

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[*] " On the Lower Greensand and Gault of Folkestone," by F. G. H. Price, F.G.S. Proc. Geol. Assoc. vol. iv.

CHAPTER IV.

After leaving East Wear Bay comparatively few sections are met with in the vicinity of Folkestone. Phosphatic nodules and fragments of *Ammonites interruptus* of bed No. I. were formerly met with on the cliff walking towards Sandgate, but are now seldom seen. The beds above No. I. seldom, if ever, occur westwards of Folkestone Church.

The Junction-bed No. I. is seen in many places about Folkestone, such as the Brickfield, near the Red-Cow Inn, on Canterbury Road, Cheriton Tile Works, where also a Company was formed for extracting the phosphatic nodules from this bed, which they worked as they do in Cambridgeshire; but it did not pay, so the works were abandoned.

About two miles north of Ashford, in some pits, the middle beds of the Gault may be seen.

Mr. Topley * states that the thickness to which it attains throughout Kent appears to be generally from 100 to 120 feet, a singular exception occurring at Trottescliffe (Trosley), between Snodland and Wrotham (at both of which latter places it is 120 feet thick), where in boring for water, which was begun a little below the outcrop, at a depth of 88 feet, a dark loamy silt was met with, 14 or 15 inches thick, which yielded water. The total thickness reached when the rod broke was 183 feet, and then the bottom was not arrived at.

There is a fine section of the Gault in a brickyard at Aylesford. The portion worked is about 30 to 35 feet from the top of the Gault, in a dark clay full of *Inoceramus sulcatus*, *Inoceramus concentricus*, *Nucula pectinata*, *Ammonites splendens*, *Belemnites ultimus*, and a species of *Hamites*, with nodules scattered throughout it. In this part, about 6 feet up, is a band of light-grey nodular limestone, full of *Inoceramus sulcatus* and coprolitic nodules cemented in it.

Next comes about 8 feet of lighter-coloured clay, with coprolites scattered throughout. It contains few fossils, *Am. varicosus*, *Nucula pectinata*, *Inoceramus sulcatus*, *Dentalium ellipticum*, Belemnites, &c. being the only ones met with; then follows light clay, weathering yellowish from presence of iron, about 6 feet thick.

Finally, light-coloured clays, with few fossils, 10 feet. These are surmounted at the further end of the pit by green glauconitic sand, with coprolites (like Cambridge beds), passing up into greenish-grey crumbling Chalk Marl, with *Avicula gryphæoides*.

There is in places a brownish marly clay below the coprolites, passing down into dark Gault below, but the passage is sudden.

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* 'Geology of the Weald,' by W. Topley, p. 148.

This section evidently represents the Upper Gault.

At Alice Holt, or Alder Holt, S.W. of Farnham, on the borders of Hants, the Gault attains its greatest elevation and largest area. There are many good sections in this region. In the railway-cutting north of the above Mr. Topley says the thickness of the Gault hereabouts is 100 or 120 feet.

The same authority states that at Fittleworth, in a railway-cutting, the Junction-bed was 4 inches thick, of a bright red grit, hard and heavy, with a great number of quartz pebbles. The same thing is observable at Petworth. At Elstead Station a section of Gault there shows about the middle of the formation. Mr. Topley goes on to say that between Burton and Duncton, opposite the road which goes off to Round House, there are some nodular masses of clay ironstone. Masses of tabular clay ironstone are met with at Folkestone in beds III. and V.; therefore this would probably be the same horizon. This has also been seen at Westwell Leacon, S.W. of Charing, Kent, by Prof. Rupert Jones [*].

At Norlington Green, Ringmer [†], at a depth of 20 feet, a red marl, a few inches thick, was found, and another occurred 10 feet lower, as seen in the blue marl at Bletchingley.

EASTBOURNE.

The Gault can only be examined here at low water; it is met with from Beachy Head, on the shore, and extends eastwards beyond the Pier. It has hitherto been considered almost unfossiliferous, but from recent examinations, made by myself and others, the contrary has been proved. Below the Martello Tower the top bed, No. XI., of the Folkestone section is met with; it consists of that portion containing the greensand seam, sometimes called the "middle greensand" by Gault geologists. At the Martello Tower, No. 74, locally termed the "Wish," a slight anticlinal brings up the Gault above high-water mark; and its junction with the sandy base of the Chalk Marl (commonly called the Upper Greensand), the *Stauronema*-zone, can be clearly seen. The Gault again crops up above high-water mark near Cow Gap, owing to another anticlinal curve. This, however, is not well seen, owing to the squeezing out of the Gault and the slipping forward of the *Stauronema*-zone and other beds of the Chalk Marl over it.

The texture of the Gault is very hard and grey; the fossiliferous portion is the sandy bed, which is about two feet in thickness, and is situated about three feet from the base of the *Stauronema*-zone. Some of the lower beds of the Upper Gault occur eastwards of the Wish; but I was not able to find many fossils in it, to ascertain the number of beds there met with.

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[*] Geol. Mag. vol. iii. No. 3, March 1875.

[†] 'Foss. of South Downs,' by Mantell.

Bed XI. contains the following fossils:—

Ammonites rostratus = A. inflatus of D'Orb.
Belemnites minimus.
—— attenuatus.
Hamites armatus.
Terebratula biplicata.
Rhynchonella Mantelli?
Plicatula pectinoïdes, in abundance.
Lima globosa, common.
—— Hoperi.
Ostrea vesicularis.
Exogyra conica.
Janira quinquecostata.
Pecten Rauliniana.
—— orbicularis.
—— Barretti?
Dentalium decussatum.
Pollicipes unguis.
Spines of Cidaris.
Lamna, teeth.
Fish remains.
Crabs, &c. Foraminifera.

About two miles inland at St. Anthony's Tower the following fossils have been found, which prove them to belong to the junction-bed of the Upper and Lower Gault, No. VIII.:—

Ammonites varicosus.
—— lautus, var. cœlonotus.
Hamites, 2 sp.
Belemnites minimus.
—— attenuatus.
Nautilus Bouchardianus.
Inoceramus sulcatus.
Dentalium decussatum.
Nucula ovata.
—— bivirgata.
Ostrea.
Smilotrochus elongatus.
Serpulæ.

The texture of the Gault at this place is hard; in colour it is light grey, much mottled with yellow, and when dry has a soapy feel to the hands.

The Rev. H. E. Maddock has furnished me with the following list of fossils he has obtained from the Gault of Eastbourne; but, in the absence of exact horizons, I should say they represent specimens from bed VII. upwards.

Judging from this group of fossils, I should be inclined to think that the *Ammonites interruptus* has been mistaken for either *Am. denarius* or *Raulinianus*, which occurs in the upper part of the Lower Gault; had *Am. interruptus* really been found, other fossils characteristic of the lowest bed of the Gault would likewise have been discovered.

Pisces.

Lamna subulata.
Corax pristodontus.
Vertebræ.
Scales of Cycloid fish.

Cephalopoda.

Ammonites tuberculatus.
—— lautus.
—— splendens.
—— auritus.
—— rostratus.
—— interruptus?
Nautilus inæqualis (probably Bouchardianus).
Hamites attenuatus.
—— maximus.
—— tuberculatus.
Belemnites ultimus.
—— minimus.
—— attenuatus.

Gastropoda.

Aporrhais carinata.
Solarium ornatum.
Dentalium decussatum.

Lamellibranchiata.

Ostrea vesicularis.
Exogyra conica.
Pecten orbicularis.
Janira quinquecostatus.
Lima, sp.
Plicatula pectinoides.
Avicula, sp.
Inoceramus concentricus.

Inoceramus sulcatus.
Nucula ovata.
—— bivirgata.
Pectunculus, sp.

Brachiopoda.

Terebratula biplicata.
Rhynchonella?

Cirripedia.

Pollicipes lævis.
—— unguis.

Ostracoda.

Cythere, sp.
Cythereis, sp.

Echinodermata.

Cidaris gaultina.

Rhizopoda.

Cristellaria, sp.

Plantæ.

Wood carbonized.

ISLE OF WIGHT.

In the Isle of Wight the Gault attains a thickness of about 100 feet; it is composed of a bluish-black clay, sandy in parts, and slightly micaceous. It is well seen at Blackgang, at Wroxhall, and parts of the Undercliff near Ventnor and Bonchurch and Compton Bay. It contains very few fossils; but the fact of *Inoceramus sulcatus*, *Ammonites rostratus*, *Solarium ornatum*, *Belemnites ultimus*, &c. being found in it, clearly proves it to belong to the Upper Gault. Between Sandown and Whitecliff Bay the Gault is about 50 feet thick, and fossiliferous. At Petersfield, near Langrish, the Upper Gault occurs in a brickfield. ('Recherches sur le Terrain Crétacé,' &c., Dr. Barrois, p. 36.)

DEVON, DORSET, WILTS, &C.

At Beer, White Cliff, Branscombe, Duncombe, and Salcombe, in Devonshire, the thickness of the Gault varies very much in the different localities, but may be roughly stated to be about 60 feet in thickness. Mr. Meyer* considers that his beds 1 to 3 may represent collectively either Gault, or Gault and Lower Greensand (in part), and, without question, the so-called Greensand of Blackdown. Mr. Etheridge believes these beds to be Gault, on the evidence of the Black-Venn section.

On the north side of Swanage Bay, near Punfield Cove, there is about 25 to 35 feet of Gault exposed, as Mr. Fordham† says, amongst the boulders forming the beach. This Gault is a bluish-green sandy clay, very dark (almost black) when wet, but weathering to a lighter colour; it contains no phosphatic nodules and few fossils.

"The Gault of Golden Cap, Stonebarrow, Black Venn, and Pinhay Cliff," Mr. De Rance‡ tells us, "consists of dark-grey coloured stiff clay, difficult to distinguish from some beds of the Lias, on which it rests. At Black Venn, where it is best seen, it is divided from the Cowstones above by a few feet of yellow sand. A comparison of the fossils from this place with those at Folkestone tends to correlate the Dorsetshire Gault with the Lower Gault of Folkestone, rather than with the Upper Gault, in which case, supposing the Whetstones in the Blackdown beds to represent the Cowstones, they and other portions of the former may be equivalents in time of the Upper Gault."

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* "Cretaceous Rocks of Beer Head and the adjacent Cliff-sections," by C. J. A. Meyer, F.G.S. Quart. Journ. Geol. Soc. 1874, vol. xxx. p. 369.

† "On the Chloritic Marl and Upper Greensand of Swanage Bay," by H. G. Fordham. Proc. Geol. Assoc. vol. iv. p. 510.

‡ "On the Deposition of Cretaceous Strata in the South-west of England," by C. E. De Rance, Esq., F.R.S. Geol. Mag., June 1874.

Mr. De Rance makes out that 32 per cent. of the fossils from the Cowstones occur in the Folkestone Gault. He also states that a comparison of many of the species occurring in the phosphatic seams of the Lower Greensand (Up. Neoc. of Kent) with those from the Junction-bed, "*Am. interruptus* zone," of the Gault of Folkestone, the "nodule bed" dividing the Lower and Upper Gault of the same place, and with those of the zone of *Scaphites æqualis* (chloritic marl) of Dorsetshire and Cambridgshire, shows a striking number of species in common and much resemblance in physical aspect—rolled and water-worn shells, drifted wood bored by shells, rolled bones of Saurians, drifted pebbles, and masses of phosphatic matter.

I find, upon referring to a list of fossils given by Mr. De Rance as occurring at Black Venn and from the Cowstones, that 27 species out of 33 there given are the same as are found in the Lower Gault of Folkestone, *i. e.* between beds I. and VIII.

The Blackdown beds, according to evidence furnished by the published list of fossils, and from those I have seen, appear to present a mixture of Upper and Lower Gault forms, leading to a supposition that these series of beds represent both divisions of the Gault.

Mr. C. J. A. Meyer considers that they likewise hold the position of the Upper Neocomian in part, that is to say, the Folkestone beds, and that they equal beds I., II., III. of the Beer-Head section.

Dr. Barrois[*], on the contrary, considers that the Blackdown beds are equivalent to the lower part of the Upper Greensand.

Messrs. Cornet and Briart consider the *Meule de Bracquegines et de Bernissart* to be equivalent to the Greensand of Blackdown.

At Lulworth Cove the Gault consists of black sandy clay about 15 feet in thickness, which represents the upper beds. This Gault resembles the Black-Venn section; and Mr. Meyer[†] considers that Gault in such condition is present both at Black Venn and in the sections to the westwards; he thinks it probable that Lower Greensand, which, as we have seen at Lulworth, actually accompanies the Gault to its extinction as a clay-bed, may form a part also of the still doubtful strata to the westwards.

The Gault continues along the foot of the escarpment through Dorsetshire to Wiltshire, where at Crockerton, Warminster, and Devizes many good sections have been had from time to time and fine fossils collected.

At Seend, in Wiltshire[‡], the Gault is 80 feet thick. South of Swindon the Gault rests unconformably on the Kimmeridge Clay.

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[*] Dr. Barrois, "L'âge des Couches de Blackdown," Ann. Soc. Géol. Nord, t. iii. pp. 1–8.

[†] "Cretaceous Rocks of Beer Head," &c., by C. J. A. Meyer, F.G.S. Quart. Journ. Geol. Soc. 1874, vol. xxx. p. 382.

[‡] 'Geology of Oxford and Valley of the Thames' (Phillips), p. 423.

MIDLAND COUNTIES.

At Nuneham Park, Oxfordshire, there is Gault; and at Culham a fine section is given by Phillips[*], showing the Gault to be blue laminated clay full of fossils, 20 feet seen, which, from the fossils, must be Lower Gault.

Mr. Jukes-Browne[†], writing about the Gault of Bedfordshire, states that from Arlesey (which is just north of Hitchin) as far as Barton the Gault continues to be about 200 feet in thickness; the pits near Shillington show the stiff blue Gault containing a few coprolites, which are externally of a light colour.

Between the villages of Barton and Sharpenhoe, about four miles S.W. of Shillington, the Gault is 200 feet in thickness. The surface of the Gault here is slightly undulating, capped with the phosphatic nodule-bed, which contains fossils mostly derived from the Gault.

In Buckinghamshire they obtain the coprolites from a bed some 40 or 50 feet down in the Gault, which is probably equivalent to bed VIII. at Folkestone. The total thickness, as shown at Eddlesborough to the south of that place, is 205 feet thick. At Puttenham, in Bucks, a coprolite-pit discloses an Upper Gault fauna.

It is a matter for regret that so little is known of the Gault in the counties of Berks, Beds, and Bucks; that it is found along the outcrop is all that can be recorded at present.

At Campton, near Shefford, a well-boring shows 28 feet through dark Gault bottom in running sand and water.

The bed from which they dig the nodules can hardly be called a nodule-bed; they seem to be scattered through about 2 feet of the clay; but the foreman says one portion 6 to 7 inches thick is the richest. The Gault above is of a light grey colour, and the seam is in the same Gault; but below it soon gets darker. There are a few green grains in the clayey matrix, where *coprolites* are most abundant.

Belemnites abound in the most extraordinary profusion, and have to be picked out before the material is ground up; the nodules are mostly rounded and lumpy in form, not elongated like those of the Upper Gault and Cambridge bed. Mr. Jukes-Browne, to whom I am indebted for this information on the Campton section, says he met with one *Hylospongia.*

The following fossils from Campton are in the Woodwardian Museum:—

Ammonites Beudanti.
—— interruptus.
—— splendens.
—— lautus.
Hamites rotundus.
—— small sp.
Belemnites attenuatus.
—— ultimus.

Inoceramus concentricus (common).
—— sulcatus (rare).
Nucula pectinata.
Plicatula pectinoides.
Hinnites, sp., ? trilinearis.
Natica gaultina.
Pleurotomaria, sp.

The above list appears to indicate a Lower Gault fauna.

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[*] Geology of Oxford and the Valley of the Thames. Prof. Phillips.

[†] "On the Relations of the Cambridge Gault and Greensand," by A. J. Jukes-Browne, F.G.S. Quart. Journ. Geol. Soc. vol. xxxi. p. 262.

The following are notes on the Gault of Ford, near Dinton, N.W. of Tring, by Mr. Walter Keeping, F.G.S., communicated by Mr. Jukes-Browne:—

"The coprolite seam is 3 or 4 inches thick, and is very constant throughout the pit, though the bed is irregular in position. The irregularity is of two kinds, the commonest being slips of a few (4–10) inches, cutting off the seam with a clear face marked with slickensides, thus:—

Fig. 1.

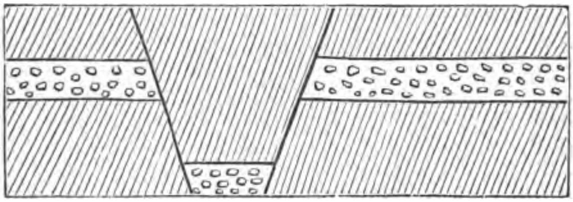
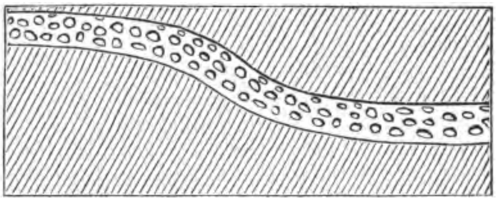


Fig. 2.



"Fig. 2, where there is a slight bending of the bed, is due, I am inclined to think, to subsequent folding, and not to irregularity of deposition.

"The matrix of the seam is a stiff calcareous clay crowded with phosphatized shells and lumps of '*coprolite*,' which in my cursory search I could not prove to have suffered from erosion previous to being imbedded in the Gault, while some of them, such as *Hamites*, were in such a condition that they could not have sustained much knocking about on a shore. A few specimens of *Plicatula sigillina* were found adhering to the nodules and fossils. In the heaps these looked very like the Cambridge coprolite, and, as at Cambridge, both forms of phosphate (light and dark) are seen; but they differ in being larger, much harder, and rarity of the tubular form, and in the strong sulphurous smell evolved upon bruising them. But it is by its fossils that this seam is best distinguished, the heap being to a great extent made up of *Inoceramus sulcatus*. Some of the commonest Cambridge species, too, are here absent or rare; *e.g.*:—

Terebratula biplicata, only one.
Plicatula pectinoides, only one.
Plicatula sigillina, a few traces of.
Ostrea frons, none.

"Above the bed comes a hard clay with iron-stained joint-planes, which is covered by a true clay, somewhat lighter-coloured than ordinary Gault, and containing a second irregular coprolite zone in a series of lenticular patches. Its nodules are smaller than in the regular seam below."

The following is a list of fossils obtained, which are in the Woodwardian Museum, Cambridge:—

Solarium ornatum, common.
Pleurotomaria Rhodani.
—— Itierianus.
Solarium conoideum.
Natica gaultina.
Aporrhais carinata.
—— marginata.
Dentalium ellipticum.
Plicatula pectinoides.
Exogyra haliotoidea.
Hinnites, n. sp.
Inoceramus sulcatus, common.
Cardita tenuicosta.
Terebratula biplicata.
Phosphatized wood.
Ammonites inflatus, large and common, =rostratus.
Ammonites varicosus.
—— lautus.
—— cristatus.
—— ochetonotus, var. of splendens.
Hamites attenuatus.
Baculites, n. sp.
Nautilus Clementinus.
Ichthyosaurus campylodon?
Plesiosaurus, n. sp.
Ischyodus?
Otodus appendiculatus.
Fish vertebræ.
Oxyrhina macrorhiza?
Trochocyathus conulus.
—— Harveyanus.
Hylospongia patera?

I append here an analysis of unground coprolites (new variety), from Slapton, Bucks (obtained by Mr. W. W. Wilkerson), by Alfred Sibson, F.C.S.:—

Moisture	·68
Phosphoric acid	30·04
Lime	46·11
Carbonic acid, oxide of iron, &c.	17·04
Insoluble matters	6·13
	100·00

Cambridgeshire.

The line of phosphatic nodules, commonly called coprolites, which is not often more than a foot in thickness, containing rolled fossils, nodules of phosphate of lime, and grains of glauconite, lies at the base of the Chalk Marl, reposing upon the eroded surface of the Gault, which is in the neighbourhood very unfossiliferous.

This bed was always considered to be Upper Greensand, until Prof. Bonney in Feb. 1872 read his paper on the "Upper Greensand or Chloritic Marl of Cambridgeshire" before the Geologists' Association; and Mr. Jukes-Browne read another paper at the Geological Society in 1875, on the "Gault of Cambridgeshire," in which they both proved that the so-called Upper Greensand was nothing more nor less than the débris of the Upper Gault. With the results of the works of these able geologists I entirely agree.

I have arrived at the opinion, from the examination of the fossils from this nodule-bed, that they result from the denudation of beds X. and XI. of the Upper Gault.

The presence of such large quantities of green grains on the fossils and pieces of phosphate in the Cambridge beds arises from the denudation of a thick seam of greensand, which seam occurs near the top of the Gault in bed XI. By comparing the fossils with those found in that bed at Folkestone, nearly all the forms are met with among these nodules; the pieces of phosphate are likewise identical both in form and general appearance with those from Folkestone.

Over forty per cent. of the fossils from the Cambridge nodule-beds are the same as those of the Upper Gault of Folkestone, the remaining number being derived from the denudation of higher beds, *i. e.* parts of the Chalk Marl.

In addition to the forty per cent. before cited, a great many more forms which have been named by Prof. Seeley, I feel confident, will, when fully investigated and compared with Gault forms, be found to be identical. These Mr. Jukes-Browne gives a list of in his paper, stating they are peculiar to the Cambridge Greensand.

I am of opinion that the Upper Greensand was never deposited at all in Cambridgeshire, and that the so-called Upper Greensand represents a period of great denudation during the deposition of the Chalk Marl; so, in point of fact, the Upper Greensand is nothing more nor less than a junction-bed between the Upper Gault and the Chalk Marl.

From information deduced from well-sections, Mr. Jukes-Browne has shown that the Gault at Cambridge is 110–130 feet in thickness, and that it gradually increases in thickness in a south-westerly direction; at Bassingbourne it is from 150 to 175 feet thick, at Guilden Morden 175–190, and at Arlesey and Hitchin 204–214 feet thick. This shows an increase of 100 feet between Cambridge and Arlesey. I quite agree with Mr. Jukes-Browne in considering that this is not wholly due to a westward thickening of the formation, but to the coming in of higher beds of the clay, as at Cambridge the Gault is decidedly blue, whilst at Guilden Morden it is of a dull slate-colour.

It is, however, difficult to say whether the diminution in thickness of the Gault be due to thinning-out or denudation; it certainly does thin northwards. At Norwich it has a thickness of 36 feet, and has entirely gone at Lynn.

We have already said that the Upper Gault is absent in Cambridgeshire from erosion; but this deposit is met with in parts of Bedfordshire and Buckinghamshire.

The following table of thicknesses to which the Gault has been met with in the various coprolite-pits along the line is taken from Mr. Jukes-Browne's paper*, and corrected by more recent information:—

	ft.		ft.
Horningsea and Cambridge	110	to	130
Grantchester	115	„	130
Haslingfield	140	„	160
Barrington	150	„	160
Wimpole	170	„	185
Bassingbourne	150	„	175
Guilden Morden	175	„	190
Ashwell	185	„	205
Arlesey and Hitchin	204	„	214

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* "On the Relations of the Cambridge Gault and Greensand," Quart. Journ. Geol. Soc. 1875, vol. xxxi. p. 261.

RED CHALK.

This formation comes on near the village of Speeton, in Yorkshire, and it may be traced along the foot of the Yorkshire and Lincolnshire wolds in a south-easterly direction to within a few miles of the Wash, to crop up again in Norfolk at Hunstanton, where it may be seen in a cliff 50 or 60 feet high; the Red Chalk continues to a place called Leziate, where it becomes incorporated with the Gault. The whole distance from Speeton to Leziate this Red Chalk lies beneath the White Chalk, and occupies the position of the Gault until Leziate is reached, where the Red Chalk ceases and the true Gault takes its place.

Travelling south-easterly from Speeton, where the Red Chalk is about 33 feet in thickness, we find it gradually thins out, as at Hunstanton it is only 4 feet thick. Mr. Wiltshire in his paper* remarks that if the Folkestone Gault is to be taken as a type of the Gault of England, then it becomes evident that the "Red Chalk" is the representative of the upper beds of the Gault, *i. e.* from between 30 feet and 70 feet above the Lower Greensand; this makes it equal to my beds IX., X., and XI. of the Folkestone section.

Mr. Wiltshire goes on to say that the red bands of Hunstanton agree in position with the Norfolk Gault, as being above the Carstone, and that the presence of iron brings it into concord with the Gault of Kent; it would appear that the Red Chalk is the representative of the upper portion of the typical English Gault.

I have come to the same conclusion from the examination of the fossils, the majority of which belong to the Upper Gault, Beds IX., X., & XI., of Folkestone,=the zone of *Ammonites inflatus* of Dr. Barrois†, and the *Belemnites-minimus* zone of Mr. Blake‡.

There are several corals found in the Hunstanton Red Chalk which do not occur in the Gault; this may be accounted for by the great distance the two formations are apart, and that they were deposited under different conditions.

I am informed by Mr. Jukes-Browne, F.G.S., that at the south end of the Lincolnshire wolds the Red Chalk is there from 10 to 12 feet thick, dark red at the bottom, where it rests on the Upper Neocomian sands, and containing in plenty *Belemnites minimus*, *Terebratula biplicata*, and occasionally *T. capillata*. The middle part is lighter red, becoming pink, and finally yellow, and it is capped by a bed of hard crystalline grey chalk, full of fragments of *Inoceramus* like that at Hunstanton.

Lithologically the Red Chalk is linked to the Chalk, but palæontographically it is equivalent to the Middle and Upper Gault.

The Red Chalk at Speeton is a marly clay, red and homogeneous, and, unlike its representative at Hunstanton, is free from pebbles.

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* "On the Red Chalk of Hunstanton," by Rev. Thos. Wiltshire, F.G.S. Quart. Journ. Geol. Soc. vol. xxv. p. 185.

† Recherches sur le Terrain Crétacé supérieur de l'Angleterre, Dr. C. Barrois. Lille, 1876.

‡ "The Chalk of Yorkshire," Rev. J. F. Blake, F.G.S. Proc. Geol. Assoc. vol. v. p. 235.

Mr. Blake, in his 'Chalk of Yorkshire,' seems to consider that the *Ammonites inflatus* (=*A. rostratus*) is not a typical form for the bed to take its name from, but suggests that it should be termed the zone of *Belemnites minimus*, in consequence of that fossil being common throughout the Red Chalk. He therefore considers that it does not only represent the Upper Gault, but the whole of the Gault.

In some places enumerated by Mr. Blake, the Red Chalk becomes of a yellowish colour, and in the different sections varies very much in thickness. He likewise makes mention of the scarcity of *Ammonites* in the Red Chalk of Yorkshire; he, however, records one 6 inches in diameter, badly preserved, most like *A. peramplus.* I would suggest that this might be a form of *A. rostratus* or *A. Goodhalli.*

In some localities the Red Chalk is exceedingly ferruginous.

This bears a strong resemblance to the "Flammenmergel" in the N.W. of Germany.

CHAPTER V.

FRANCE.

Wissant is the best place in the Bas-Boulonnais to examine the Gault formation.

Very similar conditions here obtain as in East Wear Bay, Folkestone; like the latter locality, the Gault forms the floor over which the tide flows. This place forms the S.E. side of the Weald basin. The Gault here is certainly much thinner, being only about 70 feet in thickness against 100 feet at Folkestone; the divisions adopted for the latter locality hold good in this area.

At Wissant the *Ammonites-mammillaris* zone and the *Am.-interruptus* zone (Bed I.) are mixed together, so much so that it is difficult to divide them; but the fossils from the former have the greensand matrix, and are so similar to the fossils from Folkestone that it would be hard to separate them; and the fossils of the *Am.-interruptus* zone (No. I.) are likewise in the state of rolled phosphatic casts with clay in the interstices.

D'Orbigny considers that the Gault of this area represents the Lower Gault, beginning with the zone of *Am. mammillaris*, which he includes in it.

Dr. Barrois, in his paper "Sur le Gault," published in the 'Annales de la Soc. Géol du Nord,' Nov. 18, 1874, states that "without doubt the upper part of the Lower Greensand, Folkestone beds, is our zone of Sables verts à *Am. mammillaris.*" In France these sands are argillaceous and are very abundant in fossils, which are all Gault forms; and this bed cannot be separated from the Gault. He goes on to state that if the Folkestone beds belong to the Gault, the Sandgate and Hythe beds should do so likewise, which differ from them but in an insensible manner, and ought also to belong to the Gault; one could not think of making a division in the middle of the Lower Greensand.

He likewise considers that the *mammillaris*-zone corresponds to a period of great extension in the Gault sea of the Paris basin.

But in a more recent paper, entitled "L'âge des Folkestone beds du Lower Greensand," read before the Soc. Géol. du Nord, 1st Dec. 1875, Dr. Barrois appears to have arrived at a more definite conclusion as to the division between the Lower Gault and the Upper Neocomian. He has visited Folkestone, and considers the zone of *Am. mammillaris* to belong to the Gault; and thinks the division between the two formations should be at the base of the Folkestone beds, because these beds are met with in the Boulonnais containing the same fossils. I cannot agree with him in this; for the Gault of Wissant belongs to the same basin as that of Folkestone, and at the latter place it is much thicker than at Wissant, consequently the various beds are brought closer together.

As the Gault is better seen at Folkestone than in any part of the south-eastern basin, and as the various divisions into beds hold good over most of the areas where it is exposed, whether in the Boulonnais or in England, I cannot but think that the zone of *Am. mammillaris* belongs to the Upper Neocomian, and the zone of *Am. inflatus* to the Upper Gault.

Dr. Barrois arrives at the conclusion that the Gault does not extend beyond the nodule-bed, or bed VIII. of the Folkestone section, as he considers that Bed IX., containing *Inoceramus sulcatus* and *Ammonites inflatus*, appertains to the commencement of the "craie glauconieuse" ("Cénomanien" of D'Orbigny). Although admitting that in the Upper Gault immediately above Bed VIII. marly characters begin to appear in the clays, still I am of the opinion that the Gault extends up to the dark-green sandy marl, becoming calcareous and clayey, the sandy base of the Chalk Marl, formerly called Upper Greensand.

Dr. Barrois in his new work* adopts the following divisions of the Gault:—

Zône à *Ammonites mammillaris.*	Sables verts.
Zône à *Ammonites interruptus*	Argile inférieure. Grès des Drillons. Argile des Drillons. Sable de Frécambault. Argile à *Epiaster Ricordeanus.*
Zône à *Ammonites inflatus*	Argile glauconieuse de Sancerre, Ocre de Puisaye, Marnes de Larrivour, Gaize de l'Argonne, Gaize supérieure de Réthel, Argile supérieure de Wissant, &c.

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* Mémoire sur le Terrain Crétacé des Ardennes et des régions voisines. Lille, 1878.

The geographical extension of the zone of *Am. mammillaris* is greater than that of the preceding Aptien beds; but before the end of the deposition an ascending oscillation of the earth set in and continued until the end of the deposition of the zone of *Am. Lyelli*, which lies above the *Am.-mammillaris* zone. The zone of *Am. inflatus* corresponds to a fresh invasion of the sea—that is, at least, what one would conclude from its geographical distribution varying from the preceding deposits; for this reason I have referred it to the Cénomanien.

English geologists are of opinion that it is better to attend more closely to the lithological characteristics as well as to the palæontological evidence, and to consider all the clayey and marly beds, from the top of the Folkestone beds of the Upper Neocomian (the zone of *Am. mammillaris*) up to the sandy base of the Chalk Marl and Upper Greensand respectively, as Gault.

Thus when we understand each other it is simple enough; for it cannot much matter whether the zone of *Am. mammillaris*, which is a sort of passage-bed between the Upper Neocomian and the Gault, be placed at the base of the Gault, as the French geologists consider it should be, or whether it be, as we say, the top of the Upper Neocomian series. It is again much simpler to carry the Gault up to where the sand and chert series of the Upper Greensand with *Pecten asper* (where those beds are present) and the sandy beds of the Chalk Marl commence, than to limit its extent to the Junction-bed No. VIII., and to place the marly beds of the Upper Gault, No. IX., X., & XI., the zone of *Am. inflatus*=*Am. rostratus*, in the Cénomanien. As it is, most geologists possessing only a rudimentary knowledge would not fail to recognize the Gault when they saw it, even if they could not distinguish its divisions; but were we to adopt the stratigraphy of Dr. Barrois, the Gault would only be known to geologists who make that deposit a speciality.

M. d'Orbigny divided the Gault into two portions: the Lower beds were represented by the clays of the Aube, Wissant, of the Meuse and Ardennes; the Upper beds, those of the Meuse, Ardennes (Machéroménil, Saulces-aux-Bois), and the chloritic marl of Wissant.

The Zône à *Epiaster Ricordeanus* of Dr. Barrois corresponds with my Junction-bed No. VIII., and to the Upper Gault of MM. Hébert, Tombeck, and Delatour. The fossils from this horizon are *remaniés*, broken, rolled, covered with *Serpulæ*, *Plicatulæ*, and oysters. The phosphates from this bed are much richer than those from the zone of *Am. mammillaris*. The nodules of the Sables verts à *Am. mammillaris* in the Meuse contain 18 per cent. of phosphoric acid and 39 per cent. of phosphate, and those from the Gaize à *Epiaster Ricordeanus* 25 per cent. of phosphoric acid and 55 per cent. of phosphates. Dr. Barrois considers that this bed indicates the commencement of the Cénomanien.

The Upper Gault of English and Swiss geologists corresponds to the Gaize of Argonne.

The bed of nodules of phosphate of lime of Talmats, in Argonne, equals the Cambridge nodule-bed.

The Paris basin covers a large area; but the Gault only crops out along the easterly shores of that basin, becoming thicker towards the south-east in the department of the Aube.

The principal places where the Gault has been worked by many distinguished French geologists are as follows:—In the brick- and tile-fields of Froidos (L. G.*), Clermont-en-Argonne (L. G.), Varennes (L. G.). Dr. Barrois says it has a thickness of 15 mètres (=45 feet), and not a greater thickness than 10 mètres to the north of Grandpré; to the north again, in the Pays de Réthel, in the Ardennes, exists what Dr. Barrois terms "la gaize," which are clayey sandy beds, having silica in solution, which I imagine, from the fauna, represents the Upper Gault of Folkestone, probably beds X. and XI.

The Gault does not extend to the north of Argonne. Dr. Barrois states that the Gault of Froidos, Clermont, and Varennes is followed by what he terms the "sables verts," which corresponds to our Upper Gault, beginning at the nodule-bed No. VIII.; in this "sables verts" he says they find *Ammonites inflatus*, *Solarium ornatum*, *Ostrea vesiculosa*, *Inoceramus sulcatus*; the two latter, he states, are there met with in handfuls. Since *Inoceramus sulcatus* is never found in the Lower Gault, but first makes its appearance in the nodule-bed VIII., and is a decided Gault form, and its being found so abundantly in the "sables verts" by Dr. Barrois, is sufficient proof that the "sables verts" represents the Upper Gault; consequently in the above-mentioned places the whole of the Gault is *in situ*.

Working down south-easterly in the Paris basin, we approach the department of l'Aube, which has been worked most ably by the most distinguished of French geologists.

The typical localities are as follows:—Dienville, Gérodot, Mesnil St. Père, Gaty, Maurepaire, Brienne, and Ervy, in which places several sections have been exposed; the clay is largely used in these localities for brick- and tile-making. Dr. Barrois states that the Gault of this locality averages 50 mètres in thickness, which is equivalent to more than 150 feet. I imagine that this is simply the thickness of the Lower Gault beds of *Ammonites interruptus* of English geologists. At St. Florentin, Dr. Barrois says they find a blackish marly clay, which becomes grey and greenish upon drying; from palæontological evidence this deposit represents beds X. and XI. of the Upper Gault of Folkstone.

As I have hitherto been unable to visit the Aube district, I have made careful selections from D'Orbigny's 'Paléontologie Française,' out of which I extracted a list of 175 Gault fossils found in the Département de l'Aube; out of that number, 67 are met with in the Gault of Folkestone (and I have no doubt a great many more would be recognized were we able to examine the originally described species, many of which are probably varieties of well-known English forms); 51 out of the 67 species are Lower Gault forms (fossils that are never met with above the nodule-bed No. VIII.); two of them are common to both Upper and Lower Gault, and only five belong to the true Upper Gault, and of those *Pholadomya fabrina* and *Inoceramus sulcatus* are not met with above beds IX. and X.

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* Lower Gault.

The other Upper Gault forms are *Ammonites rostratus*, *Pecten orbicularis*, and *Ostrea canaliculata*. It is certain that a considerable portion of the Upper Gault is classed by D'Orbigny as Cénomanien. Dr. Barrois considers that there is a striking resemblance in the fauna of Gaty to bed VII. of my section of the Folkestone Gault.

THE GAULT OF BRIENNE, AUBE.

From information and from fossils I have received from M. Delatour, of Brienne, I am led to believe that the whole of the Gault is to be found in that place, and that it is replete with a fauna similar to that of Folkestone; lithologically it is more sandy than clayey.

M. Albert Delatour divides the Gault into Gault inférieur and Gault supérieur; the lower division includes the upper part of the Folkestone beds (No. 4 of the Upper Neocomian series = the zone of *Am. mammillaris*), which most French geologists include in the Gault. His Gault inférieur is subdivided into two zones—the zone of *Am. Delucii* (=*Am. interruptus*, which includes my beds IV., V., and VI.), and the zone of *Belemnites minimus*, which is probably equal to my zone of *Am. interruptus*. His next division, the Gault supérieur, he divides into the zone of "Fossiles à Albiens et Aptiens" and the zone of *Am. splendens*. The former, from the list of fossils therein met with, is equivalent to the Junction-bed of Folkestone (bed VIII.), and the zone above is equivalent to the lower portion of bed IX. In a hard seam above he has obtained very large Ammonites of ten inches in diameter, which are in all probability *Am. rostratus*.

Thus, from reviewing this work, I am convinced that the Gault of Brienne obtains in much the same state palæontologically as with us. One remarkable fact worthy of note is the occurrence of *Rhynchonella lata* in their zone of "Fossiles à Albiens et Aptiens," which does not occur at Folkestone. It was only last autumn that *Rhynchonella Mantelli* was discovered in bed XI. of the Gault, just below the Greensand seam at Eastbourne.

Dr. Barrois is of opinion that when the beds of the Gault in the middle of the Paris basin have been very carefully worked, they will be enabled to correlate all the zones with those of Folkestone.

M. Delatour, of Brienne, has favoured me with ample lists of fossils he has obtained from the Gault of the northern portion of the Aube, and he has been at great pains to prepare for me a table of correlation of the Gault of that portion of France with the various beds as found at Folkestone.

In a letter he writes, "Je ne parle que de la partie nord du département, depuis Troyes, la partie sud présentant encore l'alternance des argiles et des sables venus des montagnes du Morvan, alternance qui existe à un si haut point dans l'Yonne où les sables prédominent, comme j'ai pu le voir à Saint-Florentin."

As the Gault of the north of the department of the Aube has lost all trace of sands and approaches nearer to the English Gault,

M. Delatour for that reason thought it better to take that for the correlation with the Gault at Folkestone.

In the table prepared by M. Delatour he has set forth the first column for the "sables verts inférieurs" = our zone of *Am. mammillaris*, which in that portion of the Aube is unfossiliferous.

My beds Nos. I.–VII. represent what he considers to be equivalent to the French Gault; then the Junction-bed No. VIII., which in the Aube is a ferruginous conglomerate; beds IX., X., and XI., the Upper Gault of English geologists, he considers to belong to the Cénomanien. It will be observed by the Table that the zonification of the Lower Gault differs considerably, as the *Am.-interruptus* zone, which at Folkestone represents the bottom 10 feet of the Gault, in the Aube (partie nord) is met with much higher up on the horizon of my beds IV., V., and VI. This may possibly be accounted for by his mistaking the *Am. Raulinianus* for the *Am. interruptus*, which have considerable analogies one to another.

We must always bear in mind that the zonal distribution of fossils at Folkestone is not repeated everywhere; and in comparing the Gault of different areas, single zones and single fossils will be deceitful guides: even in England *Am. interruptus* occurs throughout the Lower Gault of Bucks and Cambridgeshire, being found near Cambridge and in the Puttenham nodule-bed, where it must have been derived from the beds below. Barrois's zone of *Am. interruptus* is certainly the equivalent of the whole Lower Gault of Folkestone. It is a remarkable fact that the Junction-bed No. VIII. with them should be unfossiliferous, as in England it is quite the contrary.

M. Delatour states that the line of phosphatic nodules separating beds I. and II. abounds in *Belemnites minimus* and rolled fragments of *Am. denarius*, *Am. mammillaris*, *Dentalium decussatum*, and *Ostrea canaliculata*.

Bed VIII., the conglomérat ferrugineux at Montiérender, and its contact with beds VII. and IX., has a thickness of about 2 feet, and contains rolled and pyritized fragments of *Am. splendens*.

Out of the Table of 75 fossils, 38 are met with in beds IV., V., and VI., 55 belong to the Lower Gault, whereas only 20 belong to the Upper; 38 species do not obtain above bed VII.

In Switzerland the Gault obtains in much the same manner as in England; the Swiss geologists divide it into three portions, *i. e.*:—the Gault inférieur, consisting of yellowish sands with black fossils; Gault moyen, consisting of red and black marls with pyritized fossils; and the Gault supérieur, consisting of green sands mingled with yellow marls.

So far these divisions correlate very well with the Folkestone Gault, and for the most part the fossils are similar; but it is rather difficult to make deductions, as the Swiss palæontologists have so many species, bearing different names, which in reality have been described in France or England under still different synonyms.

The typical sections of the Gault are at Vraconne, near Sainte-Croix, Col de Cheville, Perte du Rhône, &c.

At Vraconne the bed is a regular greensand, and its fauna has been described by MM. Pictet and Campiche. Prof. E. Renevier has done the same office for the fauna of the other localities, and has named the Gault supérieur, or Grès verts supérieur, "*Vraconnien.*"

APPENDIX.

At Meux's Brewery, in the Tottenham Court Road, Prof. Prestwich* writes that at a depth of 840 feet they met with a calcareous bluish-grey clay, with a few seams of calcareo-phosphatic nodules. The fossils there found were *Ammonites splendens*, *A. lautus*, *Inoceramus concentricus*, *I. sulcatus*, *Dentalium medium*, *Belemnites ultimus*, and wood. This was 157 feet thick, then 2½ feet of greensand and clay, with half a foot of a seam of calcareo-phosphatic nodules and quartzite pebbles, making in all 160 feet.

Mr. Charles Moore, F.G.S., states that vegetable remains were tolerably abundant in this boring, also Rhizopods and Entomostraca †. The following is the list of fossils obtained:—

Vegetable stems, Baiera?
Spongia? Ventriculites.
Bulimina Preslii, *Reuss*, abundant.
Cristellaria rotula, *Lam.*, abundant.
—— cultrata, *Mont.*
—— acutauricularis, *Ficht. & Moll.*
Dentalina communis, *D'Orb.*
Frondicularia complanata, *Defr.*
—— strigillata.
——, sp.
Globigerina cretacea, *D'Orb.*
? Haplophragmium inflatum, *Reuss.*
? Lagena lævis, *Walker.*
Marginulina raphanus, *Linné.*
—— tenuissima, *Reuss.*
? Nodosaria prismatica, *Reuss.*
—— raphanistrum, *Linné.*
—— tetragona.
Nummulite?
Planularia arguta.
—— pauperata.
Planorbulina ammonoides.
Pleurostomella fusiformis, *Reuss.*
Pulvinulina caracolla, *Ræm.*
——, sp.
Quinqueloculina, sp.

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* "On the Range of the Lower Greensand and Palæozoic Rocks under London," by J. Prestwich. Quart. Journ. Geol. Soc. vol. xxxiv. p. 912.

† "On the Palæontology of the Meux-well Deposits," by Charles Moore, F.G.S. Quart. Journ. Geol. Soc. vol. xxxiv. p. 917.

Textilaria agglutinans, var. parallela, *Reuss.*
—— (Proroporus) Schulzei, *Reuss.*
Trochammina incerta.
Vaginulina recta.
—— truncata.
Verneuilina triquetra, *Münst.*
—— Bronni, *Reuss.*
Smilotrochus.
Ophiura, joints of.
Scalpellum magnum, scutes &c.
Crustacea, claws of.
Cythere ornatissima, *Reuss.*
—— quadrilatera, *Rœm.*
Polycope, sp.
Macrocypris ? arcuata, *Münst.*
? Cytheridea perforata, *Rœm.*
Cytherella ovata, *Rœm.*
—— Münsterii, *Rœm.*
—— Beyrichii, *Reuss.*
—— Williamsonii, *Jones.*
Cythere concentrica, *Reuss.*
—— quadrilatera ?
Paracypris ? gracilis, *Jones*, sp.
Pecten.
Pinna.
Ostrea.
Various small univalves.
Turbo, sp.
Hamites.
Fish-remains.
Coprolites &c.

There is nothing in the above list to denote a higher horizon than Bed IX.

At Burham, near Maidstone, a boring has shown the Gault to be 160 feet and 200 feet thick. At Wrotham the Gault has been found to be 120 feet thick. In parts of Surrey it has a less thickness; at Merstham it is about 80 feet thick.

Mr. Prestwich remarks that at places between Merstham and Guildford it is said to be not more than 30 or 40 feet thick, but no distinct measurement has hitherto been practicable *.

Throughout East Sussex the thickness of the Gault is probably about 100 feet along its outcrop; but it appears to be considerably more in the well at Warren Farm, near Brighton, where it was found to be 282 feet thick at 968 feet from the surface. This Gault varied in colour from ash-brown to bluish black and black, and at 1250 feet was found to be changing its character †.

At the new well, Crossness Junction, Outfall Works, at a depth of 833 feet, the Gault was found, which has a thickness of 170 feet, with phosphates at the bottom. At the old well, Crossness, it was found at 802 feet, with a thickness of 148 feet.

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* 'Water-bearing Strata,' p. 84.
† 'Geology of the Weald,' p. 151.

	Folkestone.							Cambridge Lower Gault.	Wissant Lower Gault.	Zone à *Am. interruptus.*	
	Junction.	Lower Gault.								Grès d'Ervy (Aube), St. Florentin (Yonne).	Argile du Gaty-Gerosdot (Aube).
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
PLANTÆ.											
Chondrites fastigiatus, *Sternb.*											
Pinites gracilis, *Carruthers*											
—— hexagonus, *Carruthers*	...	...	...	...	...	...	*	...	...	...	...
—— Pricei, *Carruthers*	...	...	...	...	...	...	...	...	...	...	...
Sequoites Gardneri, *Carruthers*	...	...	...	...	...	...	...	...	...	...	...
—— ovalis, *Carruthers*	...	...	...	...	...	...	...	...	...	...	...
Wood (bored by Lithodomi)	*										
AMORPHOZOA.											
Bonneyia bacilliformis, *Sollas*	...	...	...	...	...	...	...	...	...	...	...
Cephalites guttatus, *T. Smith*	...	...	...	...	...	...	...	...	...	...	...
——, sp.	...	...	...	...	...	...	...	...	...	...	...
Hylospongia, sp.	...	...	...	...	...	...	...	...	...	...	...
—— Brunii, *Sollas*	...	...	...	...	...	...	...	*	...	...	...
Parkeria	...	...	...	...	...	...	...	...	...	...	...
Rhabdospongia communis, *Sollas*	...	...	...	...	...	...	...	*			
Retia simplex, *Sollas*	...	...	...	...	...	...	...	...	...	...	...
Scyphia tenuis, *Rœmer*	...	...	...	...	...	...	...	...	...	...	...
Siphonia Fittoni, *Mich.*	...	...	...	...	...	...	...	...	...	...	...
—— pyriformis, *Goldf.*	...	...	...	...	...	...	...	...	...	...	...
Spongia paradoxica, *Woodward*	...	...	...	...	...	...	...	...	...	...	...
Ventriculites quincuncialis, *T. Sm.*	...	...	...	...	...	...	...	...	...	...	...
Folkestone Gault FORAMINIFERA.†											
Bulimina D'Orbignyi, *Reuss*											
—— obliqua, *D'Orb.*											
—— obtusa, *D'Orb.*											
—— Presli, *Reuss*											
Cristellaria acuta, *Reuss*											
—— complanata, *Reuss*											
—— exilis, *Reuss*											
—— lævigata, *Reuss*											
—— obsoleta, *Jones*											
—— oligostegia, *Reuss*											
—— rotulata, *Lam.*	...	...	...	...	...	...	...	...	...	...	...
—— subulata, *Reuss*											
—— sulcifera, *Reuss.*											
—— triangularis, *D'Orb.*											
Dentalina catenula, *Reuss*											

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† From 'Geology of the Weald,' by W. Topley; the particular beds unknown.

Junction. Folkestone. 7.	Nodules de Talmats (Ardennes), de Montblainville (Meuse). Nodules à *Epiaster Ricordeanus*. 8.	Folkestone. Upper Gault. 9.			Cambridge Upper Gault, *derived*. 10.	Speeton Red Chalk. 11.	Hunstanton Red Chalk. 12.	Blackdown Greensand. 13.	Wissant Upper Gault. 14.	Ardennes, Meuse (fossiles en phosphate de chaux). 15.	Ardennes, Meuse (fossiles en gaize). 16.	Larrivour, Saully, &c. (Aube et Yonne). 17.	Sainte-Croix (Gault supérieur). 18.	Cheville (couche moyenne). 19.	Puttenham, Bucks. 20.
VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Dentalina communis, *D'Orb.* ...											
—— gracilis, *D'Orb.*											
—— legumen, *Reuss*											
—— sorora, *Reuss*											
—— sulcata, *Nilsson*											
Flabellina cordata, *Reuss*											
Frondicularia Cordai, *Reuss*											
—— inversa, *Reuss*...............											
—— microdisca, *Reuss*											
—— Parkeri, *Reuss*											
Gaudryina pupoides, *D'Orb.* ...											
Glandulina mutabilis, *Reuss* ...											
Lingulina semiornata, *Reuss*											
Lituola nonionoides, *Reuss*											
Marginulina tenuissima, *Reuss*											
Miliola, sp.											
Nodosaria Jonesi, *Reuss*..........											
—— lamellicostata, *Reuss*.......											
—— obscura, *Reuss*..............											
—— orthopleura, *Reuss*..........											
Planorbulina ammonoides, *Reuss*											
—— variabilis, *D'Orb.*											
—— lobatula, *W. & J.*											
Pulvinulina caracolla, *Rœmer*...											
—— Carpenteri, *Reuss*											
—— spinulifera, *Reuss*											
Rhabdogonium excavatum, *Reuss*											
Textilaria agglutinans, *D'Orb.*..											
—— concinna, *Reuss*											
—— gibbosa, *D'Orb.*											
Trochammina cretacea, *Reuss*...											
Vaginulina arguta, *Reuss*											
—— costulata, *Rœmer*											
—— eurynota, *Reuss*............											
—— protosphæra, *Reuss*											
—— recta, *Reuss*.................											
—— strigilata, *Reuss*............											
—— transversalis, *Reuss*											
Verneuilina pyramidata, *Reuss*											
—— triquetra, *Münster*											
ACTINOZOA.											
Bathycyathus Sowerbyi, *Edw. & H.*	...	...	...	...	...	...	...	...	...	...	...
Caryophillia Bowerbankii, *Edw. & H.*	...	...	...	...	...	...	*	...	...	...	...
Cyclocyathus Fittoni, *M.-Edw.*	...	*	...	...	...	...	*	...	...	...	...
Leptocyathus gracilis, *Duncan*											
Microbacia coronula, *Goldf.* ...	...	...	...	...	...	...	...	...	...	...	...
—— Fittoni, *Duncan*											
Parasmilia ?, sp. nov.	...	...	...	...	...	*					
Sarcinula favosa, *Mich.*	...	...	...	...	...	...	...	...	...	...	...
Smilotrochus cylindricus, *Dunc.*											
—— elongatus, *Dunc.*	...	...	...	*	*	...	...	...	...	...	...

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S.R.C.	H.B.C.	B.G.	W.U.G.	A.,M.	A.,M.	L.,S.,&c.	St.-C.	C.	P.,B.
7.	8.	9.			10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Smilotrochus insignis, *Dunc.*	...	...	...	*	*	...	...	...	*		
Trochocyathus angulatus, *Dunc.*	...	...	...	...	...	...	...	*	...	...	...
—— conulus, *Edw. & H.*	*	...	...	...	...	...	...	*	...	...	...
—— consulus, *Phil.*											
†—— Harveyanus, var., *M.-Edw.*	...	*	...	...	...	*	*	...	*	...	...
—— Wiltshirei, *Duncan*											
Trochosmilia sulcata, *Edw. & Haime*	...	...	...	...	*	...	...	...	...	...	...
ECHINODERMATA.											
Bourguetecrinus rugosus, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
—— smooth var.	...	...	...	...	...	...	...	...	...	...	...
Cidaris gaultina, *Forbes*	...	...	...	...	...	...	...	...	...	...	...
Diadema Rhodani, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
Epiaster Ricordeanus	...	...	...	...	...	...	...	...	...	...	...
Goniaster Comptoni, *Forbes*	...	...	...	...	...	...	...	...	...	...	...
—— elegans, *Forbes*	...	...	...	...	...	...	...	...	...	...	...
——, sp.	...	...	...	...	...	...	...	...	...	...	...
Hemiaster Asterias, *Forbes*	*	*	*	...	*	...	*	...	*	...	...
—— Bailyi, *Forbes*	...	*	*	...	...	...	*	...	...	...	...
—— inæqualis, *Forbes*	...	...	...	...	...	...	...	...	...	...	...
—— minimus, *Desor*	...	...	...	...	...	...	...	...	...	...	...
—— Murchisoniæ, *Mant.* (=Asterias?)	...	...	...	...	...	...	...	...	...	...	...
Hemipneustes Greenovi, *Forbes*	...	...	...	...	...	...	...	...	...	...	...
Holaster suborbicularis, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
Pentacrinus Fittoni, *Aust.*	...	...	*	...	...	*	*	*	...	...	...
Pseudodiadema Brongniarti, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
—— ornata, *Goldf.*	...	...	...	...	...	...	...	...	...	...	...
—— Wiltshirii?, *Wright*	...	...	...	...	...	...	...	...	...	...	...
——, sp.	...	...	...	...	...	...	...	*	...	...	...
Torynocrinus canon, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
ARTICULATA.											
Serpula antiquata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— articulata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— carinella, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— filiformis, *Sow.*	*	...	...	...	...	...	...	...	...	...	...
—— gordialis, *Schl.*	...	...	...	...	...	...	..	...	...	...	...
—— lævis, *Goldf.*	...	...	...	...	...	...	...	...	...	...	...
—— plexus, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— rustica, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— tuba, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— vermes, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Vermicularia, sp.	...	...	...	...	...	...	...	...	...	...	...
—— concava, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Phillipsii, *Ræm.*	...	...	...	...	...	...	...	...	...	...	...

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† Prof. Duncan recognizes five varieties of this species.

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Vermicularia polygonalis, *Sow.*											
—— radiata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— umbonata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
CIRRIPEDIA.											
Cirrhipedes	...	...	...	...	...	...	...	...	...	*	*
Pollicipes lævis, *Sow.*	...	...	...	...	...	...	*	...	...	...	...
—— politus, *Darwin*	?										
—— rigidus, *Sow.*	...	*	...	...	...	...	...	...	...	...	...
—— unguis, *Sow.*	*	*	...	...	...	...	...	...	...	...	...
——, sp.	...	...	...	...	...	...	...	...	...	...	...
Scalpellum arcuatum, *Darw.*	...	...	...	...	...	...	...	...	...	...	...
CRUSTACEA.											
Alpheus ?	...	...	*								
Cythere concentrica, *Reuss*											
—— (Cythereis) gaultina, *Jones*											
—— (——) Harrisiana, *Jones*											
—— (——) ornatissima, *Reuss*											
——, var. cornuta, *Jones*											
—— (Cythereis) quadrilatera, *Rœmer*											
—— (——) triplicata, *Rœmer*											
Cytherella Münsteri, *Rœmer*											
—— ovata, *Rœmer*											
—— Williamsoniana, *Jones*											
Cytheridea Jonesiana, *Bosq.*	...	...	...	...	...	...	...	...	...	...	...
—— perforata, *Rœmer*											
Cytherideis (Bairdia) Augusta, *Münst.*											
Cytherura (Cytherella) appendiculata, *Jones*											
Diaulax Carteriana, *Bell*	...	...	...	...	...	...	...	...	...	...	...
—— feliceps, *Woodward*											
Enoplochytia (Astacus) ?, sp.											
Etyus Martini, *Mantell*	*	*	*	*	*	*	*	...	...	...	...
Glyphæa cretacea, *M'Coy*	...	...	...	...	...	...	...	...	...	...	...
Homolopsis Edwardsii, *Bell*	...	*	*	...	...	*	...	...	...	...	...
Hoploparia longimana, *Sow.*	...	*	...	...	...	...	...	...	...	...	...
—— (minima), *MS.*	...	...	...	*							
—— scabra, *Bell*	...	...	...	...	...	...	...	...	...	...	...
—— sulcirostris, *Bell*	...	...	...	...	...	...	...	...	...	...	...
——, sp.	...	*	...	...	...	...	...	...	...	...	...
Mesocrangon atra, *Woodw.*											
Neocrocarcinus Bechii, *Deslong.* (=Adelia Bechii=Notopocorystes)	...	*	...	...	...	*	...	...	*	...	...
—— tricarinatus	...	...	...	...	*	...	...	...	...	...	...
—— Woodwardi	...	...	*	*	...	*	...	...	...	...	...

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S. R. O.	H. R. O.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Palæocorystes Broderipii, *Mantell*	...	...	*	*	...	*	*	...	*		
—— Stokesii, *Mant.*	...	...	*	*	...	...	*	...	*	...	...
Scyllaridia Gardneri, *Woodw.*											
—— punctata, *Woodw.*											
Brachiopoda.											
Kingena lima, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
Rhynchonella Clementina, *D'O.*	...	...	...	...	...	...	...	...	...	...	*
—— compressa, *Lamk.*	...	...	...	...	...	...	...	...	...	...	...
—— Gibbsiana, *Sow.*	...	...	...	...	...	...	...	...	*		
—— grasiana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— latissima	...	...	...	...	...	...	...	...	...	...	...
—— lineolata, *Phill.*	...	...	...	...	...	...	...	...	...	...	...
—— rectifrons, *Pict.*	...	...	...	...	...	...	...	...	...	...	...
—— sulcata, *Park.*	?	...	...	...	...	...	...	...	...	...	*
—— Wiestii	...	...	...	...	...	...	...	...	...	...	...
Terebratella moreana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
Terebratula biplicata, *Sow.*	...	...	...	...	...	...	...	*	...	...	...
—— biplicata, var. Dutempleana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— ——, var. Folkestoniana	...	...	...	...	...	...	...	...	...	...	...
—— ——, var. obtusa	...	...	...	...	...	...	...	...	...	...	...
—— capillata, *D'Arch.*	...	...	...	...	...	...	...	...	...	...	...
—— ——, var., *D'Arch.*	...	...	...	...	...	...	...	...	...	...	...
—— Dutempleana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— megatrema	...	...	...	...	...	...	...	...	...	...	...
—— Moutoniana, *D'Orb.*	...	...	...	...	...	...	...	...	*		
—— ovata	...	...	...	...	...	...	...	...	...	...	...
—— sella ?, *Sow.*											
—— semiglobosa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Terebratulina gracilis, *Schl.*	...	...	...	...	...	...	...	...	...	...	...
—— rigida, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— striata, var., *Wahl.*	...	...	...	...	...	...	...	...	...	...	...
Waldheimia, sp.	...	...	...	...	...	...	...	...	...	...	...
Lamellibranchiata Monomyaria.											
Anomia, sp.	*	*	...	...	...	*	...	...	*	...	...
——, sp.	...	...	...	...	*	...	...	...	...	...	...
—— transversa, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
Avicula anomala, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— cenomanensis, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— gryphæoides, *J. Sow.*	...	...	...	...	...	...	...	...	*	...	...
—— Rauliniana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— subplicata, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
——, sp.	...	...	...	...	*						
——, sp.	...	...	...	*	...	...	...	...	...	...	...
Exogyra arcula, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— conica, *Sow.*	...	*	...	...	...	...	*	...	...	...	...

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A. M.	L., S., &c.	St.-C.	C.	P., B.
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
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	I.	II.	III.	IV.	V.	VI.	VII.				
Exogyra conica, var. undata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Couloni, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— haliotoidea, *Lam.* }	...	...	...	...	...	...	*	...	...	...	...
=Rauliniana, *D'Orb.* }	...	...	...	...	...	...	...	*			
—— lacinata, *Nils.*	...	...	...	...	...	...	...	...	...	...	...
—— plicata, *Lam.*	...	...	...	...	...	...	...	...	...	...	...
Gervillia anceps	...	...	...	...	...	...	...	...	...	...	...
—— rostrata ?, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— solenoides, *Defr.*	...	...	*	*	*	*	*	...	...	...	...
Hinnites, sp.	...	...	...	...	...	...	...	...	...	...	...
—— Studeri, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— trilinearis, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
Inoceramus concentricus, *Park.*	*	*	*	*	*	*	*	...	*	*	*
—— Crispii, *Mant.*	...	...	...	...	...	...	...	...	...	...	...
—— orbicularis, *Münst.*	...	...	...	...	...	...	...	...	...	...	...
—— Salomoni, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
—— subsulcatus, *Wiltshire*	...	...	...	...	...	...	...	...	...	*	...
—— sulcatus, *Park.*	...	...	...	...	...	...	...	...	...	...	...
—— tenuis, *Mant.*	...	...	...	...	...	...	...	...	...	...	...
——, sp.	...	...	...	...	...	...	...	...	...	...	...
Janira Albensis, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
—— quadricostata, *Sow*	...	...	...	...	...	*	...	...	...	...	...
—— quinquecostata, *Sow.*	*	*	...	...	...	...	*	...	...	...	...
Lima Albensis, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	...
—— Archiacana, *Corn. et Bri.*	...	...	...	...	...	...	...	...	...	...	...
—— aspera, *Mant.*	...	...	...	...	...	...	...	...	...	...	...
—— globosa, *Sow.*	...	*	...	...	...	...	*	...	...	...	...
—— Itieriana, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— parallela, *D'Orb.* (=elongata, *Sow.*)	...	*	...	...	...	...	*	...	*	...	*
—— Rauliniana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— Rhodeniana, *D'Orb.*											
—— semiornata, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— subovalis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Ostrea arduennensis, *D'Orb.*	...	...	...	...	...	...	...	...	*	...	...
—— canaliculata, *D'Orb.*	...	...	...	...	...	...	...	*	...	...	*
—— conica, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— cunabula, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— frons, *Park.*	...	...	...	...	...	...	...	...	...	...	...
—— lagena, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Lesueurii, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— macroptera (=frons), *Sow.*	...	...	...	...	...	...	...	...	...	...	*
—— Milletiana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
—— Naumanni, *Reuss*	...	...	...	...	...	...	...	...	...	...	...
—— Normaniana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— pectinata (=frons), *Lamk.*	...	...	...	...	...	...	...	...	...	...	...
—— plicatula, *Lamk.*	...	...	...	...	...	...	...	...	...	...	...
—— Rauliniana, *D'Orb.*	...	...	...	...	...	...	...	*	...	...	...
—— semiplanata, *Mant.*	...	...	...	...	...	...	...	...	...	...	...
—— sigmoidea, *Reuss*	...	...	...	...	...	...	...	...	...	...	...
—— vesicularis, *Lamk.*	...	...	*	...	...	...	...	*	...	...	...
—— vesiculosa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Pecten asper, *Lamk.*	...	...	...	...	...	...	...	...	...	...	...
—— Barretti, *Seeley*	...	...	...	...	...	...	...	...	...	...	...

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S. R. O.	H. R. O.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4,	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Pecten Beaveri, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— compositus, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— depressus, *Gold.*	...	...	...	...	...	...	...	...	...	...	...
—— Dutemplei, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
—— elongatus, *Lamk.*	...	...	...	...	...	...	...	...	...	...	...
—— Galliennei, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— hispidus, *Gold.*	...	...	...	...	...	...	...	...	...	...	...
—— laminosus, *Mant.*	...	...	...	...	...	...	...	...	*	*	*
—— membranaceus, *Nilss.*	...	...	...	...	...	...	...	...	...	...	...
—— Milleri, *Mant.*	...	...	...	...	...	...	...	...	...	...	...
—— orbicularis, *Mant.*	*	*	*	...	...	...	...	...	...	...	...
—— Raulinianus, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— allied to Raulinianus, *D'Orb*	*										
—— Rhodani, *Pict. et Camp.*...	...	...	...	...	...	...	...	...	...	...	...
—— rhotomagensis, *D'Orb.* ...	...	*	*								
—— striato-punctatus, *Ræm.* ...	...	...	...	...	...	...	...	...	...	...	...
—— Stutchburianus, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— subacutus?, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— subdepressus, *D'Arch.* ...	...	...	...	...	...	...	...	...	...	...	...
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Perna concentrica, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— lanceolata, *Gein.*............											
—— oblonga, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— Rauliniana, *D'Orb.*..........	*	...	...	...	...	...	...	...	...	...	...
—— Ricordeana, *D'Orb.*..........	...	...	...	...	...	...	...	...	...	...	...
—— rostrata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— semielliptica, *Seeley*.........	...	...	...	...	...	...	...	...	...	...	...
—— subspathulata, *Reuss*	...	...	...	...	...	...	...	...	...	...	...
Pinna Moreana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— Neptuni, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— tetragona, *Sow.*	...	*	*	*	...	*	...	...	...	...	...
——, sp.	...	...	...	...	*	*					
Plicatula inflata	...	...	...	...	...	...	...	...	...	...	...
—— pectinoides, *Sow.*............	*	*	*	...	...	*	...	*	*	...	...
—— placunea, *Lamk.* (=pectinoides)	...	...	...	...	...	...	...	...	...	...	*
—— radiola, *Lamk.* (=pectinoides)	...	...	...	...	...	...	...	...	*	...	*
—— sigillina, *Wood.*	...	...	...	...	...	...	...	*	...	...	...
Spondylus Dutempleanus, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— gibbosus, *D'Orb.*..............	...	...	...	...	...	...	...	...	...	...	...
—— hystrix, *Goldf.*...............	...	...	...	...	...	...	...	...	...	...	...
—— striatus, *Goldf.*	...	...	...	...	...	...	...	...	...	...	...
LAMELLIBRANCHIATA DIMYARIA.											
Amphidesma tenuistriatum, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Anatina (Periploma) simplex, *D'Orb.* (*See* Thracia.).........											
Arca æquilateralis, *Corn. et Bri.*	...	...	...	...	...	...	...	...	...	...	...
—— carinata, *Sow.* (*See* Cucullæa.)	...	*	...	...	...	...	...	...	*	*	*

Junction.	N. de T.	Upper Gault.			C.U.G.,*d*.	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						O. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Arca Cottaldina, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— glabra, *Park.* (*See* Cucullæa.)	...	...	...	...	...	...	...	...	*	*	*
—— Hugardiana, *D' Orb.* (=irregularis)	...	...	*	...	...	...	*	...	...	*	...
—— marullensis, *D' Orb.*	...	*	*								
—— nana, *D' Orb.*	...	*	...	...	...	...	*	...	...	...	*
—— obesa, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— Raulini, *Leym.*											
—— rotundata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Triboleti, *Pict. et Camp*....	...	...	...	...	...	...	...	...	...	...	...
Arcopagia. (*See* Psammobia.)...											
Astarte concinna, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Dupiniana, *D' Orb.*	...	...	...	...	*	...	...	...	...	*	
—— allied to Dupiniana, *D' Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— formosa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— impolita, *Sow*.........	...	...	...	...	...	...	...	...	...	...	...
—— multistriata, *Sow*.........	...	...	...	...	...	...	...	...	...	...	...
—— omalioides, *Gard. MS.* ...	...	...	...	...	...	...	*	...	...	...	...
—— striata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Cardita Constantii, *D' Orb.*	...	...	...	...	...	...	...	...	*	...	...
—— Dupiniana, *D' Orb.*	...	...	...	...	...	...	...	...	...	*	*
—— rotundata, *Pict.*	...	...	...	...	*	...	*	...	...	...	...
—— tenuicosta, *D' Orb.*	*	...	...	...	*	...	*	...	*	...	*
Cardium Constantii, *D' Orb.* ...	...	...	...	...	...	...	...	...	...	*	
—— Dupinianum. *D' Orb.*	...	...	...	...	...	...	...	...	...	*	
—— Hillanum, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— proboscideum, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Raulinianum, *D' Orb.*......	...	...	...	...	...	...	...	...	...	*	*
Corbula elegans, *Sow.*	...	...	*	...	*	...	...	...	*	...	*
—— gaultina, *Pict. et Camp.* ...	...	*	...	...	...	...	...	...	...	...	...
—— gigantea, *Sow.*.........	...	...	...	...	...	...	...	...	...	...	...
—— socialis, *D' Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— striatula, *Sow.*.........	...	...	...	...	...	...	...	...	...	...	...
—— truncata, *Sow.*.........	...	...	...	...	...	...	...	...	...	...	...
Crassatella inornata, *D' Orb.* ...	...	...	...	...	...	...	...	...	*		
Cucullæa carinata (=costellata), *Sow.*	*	*	...	...	...	...	...	...	*	*	*
—— glabra, *Park* (=fibrosa, *Sow.*)	...	...	...	...	...	...	...	...	*	*	*
—— formosa	...	...	...	...	...	...	...	...	...	...	...
Cyprina angulata, *Flem.*	...	...	...	...	...	...	...	...	...	...	...
—— cordiformis, *D' Orb*.........	...	...	...	...	...	...	...	...	*	*	
—— cuneata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— ervyensis, *D' Orb*.........	...	...	...	...	...	...	...	...	*	*	
—— globosa, *Sharpe*	...	...	...	...	...	...	...	...	...	...	...
—— ligeriensis, *D' Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— quadrata, *D' Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— regularis, *D' Orb*.........	...	...	...	...	...	...	...	...	*	*	
—— rostrata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Cytherea caperata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— lineolata, *Sow*.........	...	...	...	...	...	...	...	...	...	...	...
—— ovalis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— parva, *Sow.*	...	...	...	...	...	...	...	...	...	...	...

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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						O. L. G.	W. L. G.	G. d'E.	A. du G.
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	I.	II.	III.	IV.	V.	VI.	VII.				
Cytherea plana, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— subrotunda, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— truncata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Fimbria gaultina, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
Gastrochena pyriformis, *Mant.*	*	...	...	...	...	...	...	...	...	...	...
—— brevis, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
Isoarca cantabrigensis, *Seeley* (?=Agassizii, *P. & Roux*)	...	...	...	...	...	...	...	...	...	...	...
Isocardia cryptoceras, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
Lavignon Clementina, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
—— subphaseolina, *D'Orb.* (=Tellina)	...	...	...	...	...	...	...	...	...	...	*
Leda phaseolina, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— porrecta, *Reuss*	...	...	...	...	...	...	...	...	...	...	...
—— solea (allied to), *D'Orb.*	...	*	*	...	*	...	*	...	*	*	...
Lucina arduennensis, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— orbicularis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— pisum, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— sculpta, *Phill.*	...	...	...	...	...	*	...	...	...	*	...
—— tenera, *Pict. et Camp.*	...	*	...	...	...	...	...	...	...	...	...
—— Vibrayeana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
Lutraria. (*See* Mactra.)											
Mactra angulata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— substriata, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
Modiola reversa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Mya. (*See* Panopæa.)											
Mytilus Galliennei, *D'Orb.*	...	...	*	...	...	...	...	...	...	...	...
—— Giffreanus, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— inæquivalvis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— prælongus, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— striato-costata, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— tridens, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Neæra Sabaudiana, *Pict. et Camp.*	...	...	...	...	*	*	*				
—— sanctæ crucis, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
Nucula albensis, *D'Orb.*	...	...	...	...	...	...	*	...	*	...	*
—— (Leda) angulata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— antiquata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— apiculata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Arduennensis, *D'Orb.*	...	...	...	...	*						
—— bivirgata, *Fitton*	...	...	...	...	...	...	*	...	*	...	*
—— capsæformis, *Mich.* (=De Rancei, *Price*)	*	*	...	...	...	...	...	...	*		
—— impressa, *Sow.*	...	...	...	...	*	*	*	...	...	...	*
—— (Leda) Mariæ, *D'Orb.* (=lineata, *Sow.*)	...	*	...	*	*	*	*	...	*	...	*
—— obtusa, *Fitton*	...	*	...	...	...	...	*	...	...	...	*
—— ornatissima, *D'Orb.*	...	...	...	...	...	...	*	...	*	...	...
—— ovata, *Mant.*	*	*	*	*	*	*	*	...	*	*	*
—— pectinata, *Sow.*	*	*	*	*	*	*	*	...	*	*	*
—— Renauxiana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— rhomboidea, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— subelliptica, *Seeley*	...	...	...	...	...	...	...	...	...	..	...

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
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	I.	II.	III.	IV.	V.	VI.	VII.				
Nucula (Leda) subrecurva, *Phil.*	*	...	...	*	*	...	...	...	*	...	*
—— (——) Vibrayeana, *D' Orb.*	...	...	...	...	*	...	*	...	*	...	...
Opis Hugardiana, *D' Orb*	...	...	...	...	...	...	...	...	...	*	
Panopæa acutisulcata, *D' Orb*	...	...	...	...	...	...	...	...	...	*	...
—— inæquivalvis, *D' Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— ovalis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— plicata, *D' Orb*	*	*	...	...	...	...	...	...	*	*	...
Pectunculus sublævis, *Sow*	...	...	...	...	...	*	...	...	...	...	...
—— sp. (=Lucina orbicularis?)	...	*									
—— umbonatus, *Sow*	...	...	...	...	...	*	*	...	...	...	...
Periploma. (*See* Thracia.)											
Petricola canaliculata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— nuciformis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Pholadomya decussata, *Phil.*											
—— ——, var. triangularis, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— fabrina, *D' Orb.*	*	...	...	...	...	...	...	...	...	*	...
Pholas constricta, *Phil.*	*	...	...	...	...	...	...	...	...	...	...
—— Rhodani, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— sanctæ crucis, *Pict. et Camp.*	...	*	...	...	...	...	...	...	...	...	...
——, sp. nov.	...	...	...	...	...	...	...	...	...	...	...
—— subcylindrica, *D' Orb.*	...	...	...	...	...	...	...	...	...	*	
Psammobia gracilis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Solen Dupinianus, *D' Orb.*	...	...	...	...	...	...	...	...	...	*	
—— Moreanus, *Buv.*	...	...	...	...	...	...	...	...	...	...	...
Sphæra?, sp.	...	...	...	...	...	...	...	...	...	...	...
Tellina inæqualis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Moreana, *D' Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— phaseolina, *Pict. et Camp.* (= Lavignon phaseolina, *D' Orb.*, =Scrobicularia phaseolina, *Phil.*)	...	*	...	...	...	*	...	...	...	...	...
—— striatula, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
——, sp.	...	...	*	...	...	...	*				
Teredo argonensis, *Buv.*	...	...	...	...	...	*	...	...	*		
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Thetis gigantea, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— lævigata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— major, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— minor, *Sow.* (= Sowerbyi, *Ræmer*)	...	...	...	*	...	*	*	...	*	*	...
Thracia sanctæ crucis, *Pict. et Camp.*	...	*	...	...	...	...	*	...	...	*	
—— (Periploma) simplex, *D' Orb.*	...	...	...	...	...	...	...	...	*	*	
Trigonia affinis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— alæformis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Archiaciana, *D' Orb.*	...	...	...	...	...	...	...	...	...	*	
—— caudata, *Agas.*	...	...	...	...	...	...	...	...	*	*	...
—— dædalea, *Park.*	...	...	...	...	...	...	...	...	...	...	...
—— Elisæ, *Corn. et Bri.*	...	...	...	...	...	...	...	...	...	...	...
—— excentrica, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Fittoni, *Desh.*	*	...	...	...	...	...	...	...	*	*	*

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
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	I.	II.	III.	IV.	V.	VI.	VII.				
Trigonia Fittoni, var. nov.	*										
—— quadrata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— scabricula, *Morris*	...	...	...	...	...	...	...	...	...	...	...
—— sinuata, *Park.*	...	...	...	...	...	...	...	...	...	...	...
—— spectabilis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— spinosa, *Park.*	...	...	...	...	...	...	...	...	...	...	...
—— ——, var. subovata, *Lycett*	...	...	...	...	...	...	...	...	...	...	...
Unicardium, sp.	...	...	...	...	...	...	...	...	...	...	...
Venus Faba, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— immersa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Rotomagensis, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— sublævis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— submersa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— tenera. (*See* Lucina.)											
—— Vibrayeana, *D'Orb.*	...	...	...	...	...	...	...	...	*	*	*
GASTROPODA. *Siphonostomata.*											
Aporrhais calcarata, *Sow.* (*See* Dimorphosoma.)											
—— carinata, *Mant.*	*	*	...	...	*	*	*	...	*	*	...
—— carinella, *D'Orb.*	...	...	...	...	...	*	*	...	...	*	*
—— cingulata, *Pict. et Roux.* (*See* Tridactylus.)											
—— elongata, *Sow.*	...	...	*	...	...	*	*	...	...	...	...
—— Griffithsii, *Gard.* (*See* Tridactylus.)											
—— marginata, *Sow.* (= Orbignyana, *Pict.*)	*	*	*	*	*	*	*	...	...	...	...
—— maxima, *Price*	...	...	...	...	...	...	...	...	...	...	...
—— Muleti, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
—— Orbignyana, *Pict.* (*See* marginata.)											
—— Parkinsoni, *Mant.*	...	...	...	...	...	...	*	...	...	...	...
—— pseudosubulata, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— retusa, *J. Sow.* (*See* Ornithopus.)											
Buccinum gaultinum, *D'Orb.*	*	...	...	...	...	...	*	...	*	...	...
Dimorphosoma calcarata, *Gard.* (= Aporrhais calcarata)	...	...	...	...	...	...	...	...	...	...	...
—— Doratochila, *Gard.*	...	*									
—— toxochila, *Gard.*	...	...	...	*	...	*					
Fusus acteon, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— albensis, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— clathratus, *Fitton*	...	...	...	...	...	...	...	...	...	...	...
—— Clementinus, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
—— Cottaldinus, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
—— Dupinianus, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— elegans	...	...	...	...	...	*	*				
—— gaultinus, *D'Orb.* (= rusticus, *Fitton*)	...	...	...	...	*	...	...	...	...	...	*
—— indecisus, *D'Orb.*	...	...	...	...	*	...	*	...	...	...	*
—— Itierianus, *D'Orb.*	...	*									

Junction.	N. de T.	Upper Gault.			C.U.G.,d.	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
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	I.	II.	III.	IV.	V.	VI.	VII.				
Fusus rusticus, *Fitton*	...	...	...	...	*	...	...	...	...	...	*
—— Smithii, *Sow.*	*	...	...	...	...	...	...	...	...	...	...
—— subelegans, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
—— allied to trunculus, *Pict.*	...	...	...	...	...	...	...	...	...	...	...
—— Vibrayeanus, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
Murex bilineatus, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— calcar, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— carinella, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— genevensis, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— Sabaudianus, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
Ornithopus (Pteroceras) histochila, *Gard.*	...	...	...	...	...	*	...	...	...	...	...
—— retusa, *Sow.* (=bicarinatum, *D'Orb.*)	...	*	*	...	...	*	*	...	...	*	*
Pteroceras. (*See* Ornithopus.)											
Pyrula Brightii, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— depressa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Rostellaria. (*See* Aporrhais.)											
Tridactylus (Aporrhais) cingulata, *Pict. et Roux*	...	...	...	...	...	*	*	...	...	...	...
—— Griffithsii, *Gard.*	...	...	..	...	*	*	*				
Holostomata.											
Acmæa. (*See* Tectura.)											
Actæon affinis, *D'Orb.*	...	*	...	...	*	*	...	...	...	...	...
—— Vibrayeana, *D'Orb.*	...	...	...	...	...	...	...	...	*	*	*
Avellana Clementina, *D'Orb.*	...	...	...	...	...	..	...	...	...	*	*
—— Dupiniana, *D'Orb.*	...	...	...	...	...	...	*	...	...	*	
—— Hugardiana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— incrassata, *Sow.*	...	...	...	...	...	...	...	...	...	*	...
—— inflata, *D'Orb.*	...	...	...	...	*	*	*	...	*	*	...
—— lacryma, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
—— ovula, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— pulchella, *Price*	...	...	*	*	*	*	*				
—— Rauliniana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— Valdensis, *Pict. et Camp.*	...	...	...	...	...	..	...	...	...	...	...
Bellerophina minuta, *Sow.* (=Vibrayeana, *D'Orb.*)	...	...	...	...	*	*	*	...	*	...	*
Brachystoma angularis, *Seeley*	...	...	...	...	*	...	...	...	...	...	...
Cadulus gaultinus, *Gard.*	...	*	...	...	...	...	*	...	...	...	...
Calyptræa Cooksoniæ, *Seeley* (=sanctæ crucis, *Pict. et Camp.*)	...	...	...	...	...	...	...	...	...	...	...
—— concentrica, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
Cerithium Chavannesi, *Pict. et Camp.*	...	*	*	...	...	...	*				
—— Ervynum, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— gracile, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Lallierianum, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
—— mosense, *Buv.*	...	...	...	...	...	...	...	...	...	...	...
—— neocomiense, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— ornatissimum, *Desh.*	...	...	...	...	...	...	...	...	...	*	
—— Phillipsii, *Leym.*	...	...	...	...	...	...	*				
—— subspinosum, *Desh.*	...	*	...	...	*	...	*	...	...	*	*

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
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	I.	II.	III.	IV.	V.	VI.	VII.				
Cerithium tectum, *D'Orb.*	...	*	...	...	...	*	...	...	...	...	*
—— trimonile, *Mich.*	*	*	...	...	...	...	...	...	*	...	*
—— Vibrayeanum, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
——, sp.	...	*									
——, sp.	...	...	...	...	...	...	*	...	...	...	...
——, sp.	...	...	...	...	*						
Crepidula alta (var. gaultina)...	...	...	...	...	...	...	...	...	...	...	...
—— gaultina, *Buv.*	...	...	...	...	...	...	...	...	...	...	...
Dentalium acuminatum, *Gard.* .	...	...	...	...	...	...	*				
—— alatum, *Gard.*	...	..	...	...	...	...	...	...	...	...	...
—— cylindricum, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— decussatum, *Sow.*	...	*	...	*	*	...	...	...	*	*	*
—— Jeffreysi, *Gard.*	...	...	...	...	*	*	*	...	...	...	...
—— medium, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Rhodani, *Pict. et Roux* —— ellipticum, *J. Sow.* (=decussatum, *Sow.*)											
Entalis Meyeri, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
Funis cancellatus, *Gard.*	...	*	...	...	*	...	...	...	...	...	...
Helcion (Acmæa) dubium, *Mich.*	...	...	...	...	...	...	...	...	...	*	*
—— tenuicosta†, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
Hipponyx, sp.	*										
Littorina conica, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— gracilis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Narica cancellata, *Chemn.*	...	*									
—— carinata, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— granosa, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
Natica Clementina, *D'Orb.* (=pungens, *Sow.*).............	...	...	...	*	*	*	*	...	*	...	...
—— Dupiniana, *Leym.*	...	...	...	...	...	...	...	...	...	...	*
—— Ervyna, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— excavata, *Mich.*	...	...	...	...	...	...	...	...	*	*	*
—— extensa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— gaultina, *D'Orb.*	...	*	...	...	*	...	*	...	*	*	...
—— granosa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— levistriata, *J. Browne*	...	...	...	...	...	...	*	?	...	...	...
—— obliqua, *Price*	...	...	...	*							
—— Rauliniana, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— Rhodani, *Pict. et Roux* ...	...	...	...	...	...	...	...	...	...	...	...
—— rotundata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— subconica, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Patella. (*See* Helcion.)											
Phasianella? Ervyna, *D'Orb.* ...	...	...	...	...	*	*	...	...	...	*	*
—— gaultina, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
Pileopsis dubia, *Gard.*‡											
—— Seeleyana, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
Pleurotomaria allobrogensis, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— gaultina, *D'Orb.*	...	...	...	...	...	...	...	...	*	...	...
—— Gibbsii, *Sow.* (=gurgites, *D'Orb.*)	...	...	...	...	...	...	...	...	...	...	...
—— La Harpi, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— Moreausiana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— regina, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...

† =Tectura tenuicosta.

‡ From Folkestone Gault; bed unknown.

Junction.	N. de T.	Upper Gault.			C.U.G.,*d.*	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Cerithium tectum, *D'Orb.*	...	*	...	...	...	*	...	...	...	...	*
—— trimonile, *Mich.*	*	*	...	...	...	...	...	...	*	...	*
—— Vibrayeanum, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
——, sp.	...	*									
——, sp.	...	...	...	...	...	...	*	...	...	...	...
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Crepidula alta (var. gaultina)	...	...	...	...	...	...	...	...	...	...	...
—— gaultina, *Buv.*	...	...	...	...	...	...	...	...	...	...	...
Dentalium acuminatum, *Gard.*	...	...	...	...	...	...	*				
—— alatum, *Gard.*	...	..	...	...	...	...	...	...	...	...	...
—— cylindricum, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— decussatum, *Sow.*	...	*	...	*	*	...	...	...	*	*	*
—— Jeffreysi, *Gard.*	...	...	...	...	*	*	*	...	...	...	...
—— medium, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Rhodani, *Pict. et Roux* —— ellipticum, *J. Sow.* (=decussatum, *Sow.*)											
Entalis Meyeri, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
Funis cancellatus, *Gard.*	...	*	...	...	*	...	...	...	...	...	...
Helcion (Acmæa) dubium, *Mich.*	...	...	...	...	...	...	...	...	...	*	*
—— tenuicosta†, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
Hipponyx, sp.	*										
Littorina conica, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— gracilis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Narica cancellata, *Chemn.*	...	*									
—— carinata, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— granosa, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
Natica Clementina, *D'Orb.* (=pungens, *Sow.*)	...	...	...	*	*	*	*	...	*	...	...
—— Dupiniana, *Leym.*	...	...	...	...	...	...	...	...	...	...	*
—— Ervyna, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— excavata, *Mich.*	...	...	...	...	...	...	...	...	*	*	*
—— extensa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— gaultina, *D'Orb.*	...	*	...	...	*	...	*	...	*	*	...
—— granosa, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— levistriata, *J. Browne*	...	...	...	...	...	...	*	?	...	...	...
—— obliqua, *Price*	...	...	...	*							
—— Rauliniana, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— Rhodani, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— rotundata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— subconica, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
Patella. (*See* Helcion.)											
Phasianella? Ervyna, *D'Orb.*	...	...	...	...	*	*	...	...	...	*	*
—— gaultina, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
Pileopsis dubia, *Gard.*‡											
—— Seeleyana, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
Pleurotomaria allobrogensis, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— gaultina, *D'Orb.*	...	...	...	...	...	...	...	...	*	...	...
—— Gibbsii, *Sow.* (=gurgites, *D'Orb.*)	...	...	...	...	...	...	...	...	...	...	...
—— La Harpi, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— Moreausiana, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— regina, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...

† =Tectura tenuicosta.

‡ From Folkestone Gault; bed unknown.

Junction.	N. de T.	Upper Gault.			C.U.G.,d.	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
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Pleurotomaria Rhodani, *Brong. in Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— Rouxi, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— Thurmanni, *Pict. et Roux*	...	...	...	...	...	...	...	...	...	...	...
—— vraconnensis, *Pict. et Camp.*	...	...	...	...	...	...	...	...	..	...	...
——, sp. allied to Margueti, *Renv.*	...	...	...	...	...	...	...	...	...	...	...
Pyrgiscus gaultinus, *Gard.*	...	*	...	*	...	...	*				
—— tenuistriatus, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— Woodwardii, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
Ringinella. (*See* Avellana.) ...											
Rissoa Dupiniana, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
Rissoina incerta, *D'Orb.*	...	*	*	*	*	*	...	...	...	*	
—— Sowerbyii, *Gard.* (=Scalaria Gastyna, *D'Orb.*)	...	*	*	*	*	*	...	...	...	...	*
Scalaria Clementina, *Mich.*	...	*	*	...	...	*	*	...	...	*	*
—— climaspira, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
—— Dupiniana, *D'Orb.*	...	*	...	*	...	...	*	...	*	*	*
—— elongatus, *Seeley*											
—— Fittoni, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
—— gaultina, *D'Orb.*	...	...	...	...	...	...	...	...	*	...	...
—— pulchra, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Queenii, *Gard.*	...	...	...	...	...	...	...	...	...	...	...
Siphodentalium affine, *Gard.*†											
—— curvum, *Gard.*†											
Solarium albense, *D'Orb.*	...	...	...	*	*	...	...	...	...	*	
—— cirrhoide, *D'Orb.*	...	...	...	...	...	...	...	...	*	*	...
—— conoideum, *Sow.*	...	...	...	...	*	*	*	...	*	...	...
—— dentatum, *D'Orb.*	...	...	...	...	...	...	...	...	*	...	...
—— granosum, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— moniliferum, *Mich.*	...	...	...	*	*	...	...	...	*	*	*
—— ornatum, *Sow.*	...	...	*	...	*	*	*	*	*	...	...
—— Rochatianum, *Pict. & Roux*	...	...	...	...	...	...	...	...	...	*	...
—— Tingryanum, *Pict. & Roux*	...	...	...	...	...	...	...	...	...	...	...
Tectura (Acmæa) tenuicostata, *D'Orb.*	...	*	...	...	*	*	*	...	...	...	...
—— (——) ——, var. tenuistriata, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
Trochus Bathus, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— Buvignieri, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— cancellatus, *Seeley* (=indecisus, *D'Orb.*)	...	...	...	...	...	...	...	...	...	...	...
—— conoideus, *D'Orb.* (=Solarium conoideum, *Sow.*)	...	...	...	...	...	...	...	...	*		
—— Tollotianus, *Pict. & Roux*	...	...	...	...	...	...	...	...	...	...	...
Turbo alsus, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— bicultratus, *D'Orb.*	...	...	..	...	...	...	...	...	...	...	...
—— Brunneri ?, *Pict. & Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— carinatus, *Morris*	...	...	...	...	...	...	...	...	...	...	...
—— monilifera, *Sow.* (=Solarium)	...	...	...	...	...	...	...	...	..	...	...
—— munitus, *Forbes*	...	...	...	...	...	...	...	...	...	...	...

† From Folkestone Gault; bed unknown.

Junction.	N. de T.	Upper Gault.			C.U.G.,*d*.	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P. B.
7.	**8.**	**9.**			**10.**	**11.**	**12.**	**13.**	**14.**	**15.**	**16.**	**17.**	**18.**	**19.**	**20.**
VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Turbo Pictetianus, *D'Orb.* (= Turboidea nodosa, *Seeley*) ...	...	...	...	...	...	...	...	...	...	...	...
—— plicatilis, *Desh.*	...	...	...	...	...	...	...	...	...	*	
—— subdispar, *D'Orb*............	...	...	...	...	...	...	...	...	...	*	
Turritella costata, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— granulata, *Sow.*	...	...	*	...	...	...	*	...	...	...	...
—— Rauliniana, *D'Orb*..........	...	...	...	...	...	...	...	...	...	...	...
—— Vibrayeana, *D'Orb*..........	...	...	...	...	*	...	*	...	...	...	*
——, allied to alternans, *Ræm.*	...	...	...	...	...	...	...	...	...	...	...
Tylostoma, sp.	...	*									
Cephalopoda.											
Ammonites auritus, *Sow.*	*	...	...	...	...	*	*	...	*	...	...
—— ——, var.	...	...	*	...	*	*	*				
—— ——, var. with spines ...	...	*									
—— Balmatianus, *Pictet*	...	...	...	...	...	...	...	...	...	...	...
—— Beaudanti, *Brongn.*	...	...	...	...	...	...	...	...	*	*	*
—— bicurvatus, *D'Orb.* (=A. Cleon, *D'Orb.*)											
—— Bouchardianus, *D'Orb.* ...	...	...	...	...	...	...	...	...	...	...	...
—— Brongniartianus, *Pictet* (=rhamnonotus, *Seeley*)......	*	...	...	...	...	...	...	..	...	...	...
—— Candolleanus, *Pict. & Roux* (=symmetricus)	...	...	...	...	...	...	...	...	...	...	...
—— Clementinus, *D'Orb.* (=A. mammillatus, *Schl.*)............											
—— Cleon, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	*
—— cœlonotus, *Seeley* (=A. Valbonensis, var., *Hebert*)	...	...	...	...	...	...	...	...	...	...	...
—— cornutus, *Pictet*	...	...	...	...	...	*	...	...	...	...	...
—— crenatus, *Sow.* (=A. splendens)											
—— cristatus, *De Luc*............	...	...	...	...	...	...	...	...	...	...	...
—— Delaruei, *D'Orb.*	...	...	...	*	...	...	...	...	*	...	...
—— Delucii, *Brong.*(=A. interruptus, *D'Orb.*)..................											
—— denarius, *Sow*................	...	*	...	...	*	*	*	...	*	...	...
—— Deshayesi, *Leym*............	*										
—— dispar, *D'Orb.*...............	...	...	...	...	...	...	...	...	...	...	...
—— Dupinianus, *D'Orb.* (=Parandieri, *D'Orb.*)	...	...	...	...	...	...	...	...	...	*	*
—— Dutempleanus, *D'Orb.*(=A. fissicostatus, *D'Orb.*)............											
—— equicostatus, *Price, MS.* (? var. of cornutus)	...	...	...	...	...	*					
—— falcatus, *Mant.*	...	...	...	...	...	...	...	...	...	...	...
—— fissicostatus, *D'Orb.*	...	...	...	...	...	...	...	...	*	...	...
—— glossonotus, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— Goodhallii, *Sow.*............	...	...	...	...	...	...	...	...	...	...	...
—— Hugardianus, *D'Orb.*.......	...	...	...	...	...	...	...	...	...	...	...
—— inflatus, *D'Orb.* (=rostratus, *Sow.*)	...	...	...	...	...	...	...	...	...	...	...
—— interruptus, *Brug.*	*	...	...	...	...	...	...	*	*	*	*

Junction.	N. de T.	Upper Gault.			C.U.G., *d*.	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
7.	8.	9.			10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
	1.	2.						3.	4.	5.	6.
	I.	II.	III.	IV.	V.	VI.	VII.				
Ammonites Itierianus, *D'Orb.*	...	...	...	...	...	..	...	...	...	...	...
—— latidorsatus, *Mich.*	...	...	...	...	...	...	...	...	...	*	*
—— lautus, *Sow.*	...	...	...	...	*	*	*	*	*	...	...
—— ——, var. (=cœlonotus, *Seeley*)	...	...	...	...	...	...	...	...	*	...	...
—— Lyelli, *Leym.*	...	...	...	...	...	...	...	...	...	*	*
—— mammillaris, *Schloth.*	...	...	...	...	...	...	...	...	*	*	*
—— Mantelli, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— Mayorianus, *D'Orb.* (=var. of planulatus)	...	...	...	...	...	...	...	...	...	...	...
—— Milletianns											
—— pachys, *Seeley* (var. of Am. rostratus)	...	...	...	...	...	...	...	...	...	...	...
—— Parandieri, *D'Orb.* (=A. Dupinianus, *D'Orb.*)	...	...	...	...	...	...	...	...	...	...	...
—— peramplus	...	...	...	...	...	...	...	...	...	...	...
—— Pictetianus, *D'Orb.*	...	...	...	...	...	...	...	...	...	*	
—— planulatus, *Sow.* (=A. Mayorianus)	...	...	...	...	...	...	...	...	...	...	...
—— Quercifolius, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— Raulinianus, *D'Orb.*	...	...	...	...	*	...	*	*	*	*	...
—— regularis, *Brug.*	...	...	...	...	...	...	...	...	...	*	
—— Renauxianus, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— Roissyanus, *D'Orb.*	*										
—— rostratus, *Sow.* (=Candolleanus, *Pict.* =inflatus, *D'Orb.* =pachys, *Seeley* =symmetricus, *Sow.*)	...	...	...	...	...	...	...	*	...	...	...
—— Salteri, *Sharpe*	...	...	...	...	...	...	...	...	...	...	...
—— selliguinus, *Brong.* (=A. Mayorianus, *D'Orb.*?)	...	...	...	...	...	...	...	...	...	...	...
—— sexangulatus, *Seeley* (=gardonicus, *Hebert*)	...	...	...	...	...	...	...	...	...	...	...
—— splendens, *Sow.*	...	*	...	...	...	...	*	*	*	...	...
—— ——, var. cratus, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— ——, var. leptus, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— symmetricus, *Sow.* (=Candollianus)	...	...	...	...	...	...	...	...	...	...	...
—— Studeri, *Pict. & Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— tardefurcatus, *Leym.*	...	...	...	...	...	...	...	...	...	*	
—— tetragonus, *Seeley*	...	...	...	...	...	...	...	...	...	...	...
—— Timotheanus, *Pict.*	...	...	...	...	...	...	...	...	...	...	...
—— triserialis, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— tuberculatus, *Sow.*	...	...	...	...	*	...	...	...	*	...	...
—— Valbonensis, *Hebert* (=var. of cœlonotus)	...	...	...	...	...	...	...	...	...	...	...
—— varians, *Sow.*	...	...	...	...	...	...	...	...	...	...	...
—— varicosus, *Sow.*	...	...	...	...	...	...	...	*	...	...	...
—— Velledæ, *Mich.*	...	...	...	...	...	...	...	...	...	...	*
—— versicostatus, *Mich.*	...	...	...	...	...	...	*	...	...	...	*
—— Vraconensis, *Pict. & Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— Weistii, *Sharpe*											
—— Woodwardi, *Seeley*	...	...	...	...	...	...	...	...	...	...	...

Junction.	N. de T.	Upper Gault.			C.U.G.,*d*.	S. R. C.	H. R. C.	B. G.	W. U. G.	A., M.	A., M.	L., S., &c.	St.-C.	C.	P., B.
7.	8.	9.			10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
VIII.		IX.	X.	XI.											
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	Junction.	Lower Gault.						C.L.G.	W.L.G.	G.d'E.	A.du G.
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	I.	II.	III.	IV.	V.	VI.	VII.				
Ancyloceras spinigerum, *Sow*...	...	*	...	...	...	...	...	...	*	...	...
—— tuberculatum, *Sow*..........	...	...	...	...	...	...	...	...	...	...	...
Anisoceras alternatus, *Mant*. ...	...	...	...	...	...	...	...	...	...	...	...
—— armatum, *Sow*.	...	...	...	...	...	...	...	...	...	...	...
—— perarmatus, *Pict. & Camp*.	...	...	...	...	...	...	...	...	...	...	...
—— Saussureanum, *Pict. & Camp*.	...	...	...	...	...	...	...	...	...	...	...
Belemnites attenuatus, *Sow*. ...	...	...	...	...	*	*	*	...	*	...	...
—— minimus, *Lister*	*	*	...	...	*	*	*	*	...	...	...
—— ultimus, *D'Orb*.	*	*	...	...	*	*	*	*	...	...	...
Baculites baculoides, *Mant*. ...	...	...	...	...	...	...	...	...	...	...	...
—— Gaudini, *Pict. & Camp*....	...	...	...	...	*	*	...	...	...	...	...
Orioceras Asterianus, *D'Orb*. ...	*										
Hamites alternatus	...	...	...	...	...	...	...	...	...	...	*
—— alterno-tuberculatus, *Leym*.	...	...	...	...	...	...	...	...	...	...	*
—— Bouchardianus, *D'Orb*. ...	...	...	...	...	...	...	...	...	*		
—— compressus, *Sow*. (=intermedius)	...	...	...	...	...	...	...	...	...	...	...
—— Desorianus, *Pict*.	...	...	...	...	...	...	...	...	...	...	...
—— elegans, *D'Orb*.	...	...	...	...	...	...	...	...	...	*	...
—— flexuosus, *D'Orb*............	...	...	...	...	...	...	...	...	...	...	...
—— intermedius, *Sow*. (=attenuatus)	...	...	*	...	*	*	...	*	*	...	...
—— maximus, *Sow*................	...	...	...	...	...	*	*	...	...	...	...
—— nodosus, *D'Orb*.											
—— rotundus, *D'Orb*. (=intermedius, *Sow*.)	*	...	...	...	...	...	...	...	*	...	...
—— Sablieri, *D'Orb*.	...	...	...	...	*						
—— simplex, *D'Orb*.	...	...	...	...	...	...	*				
—— tuberculatus, *Sow*.	...	...	...	...	*						
—— turgidus, *Sow*...............											
—— virgulatus, *D'Orb*.	...	...	...	...	...	...	*	...	...	...	*
Helioceras annulatus, *D'Orb*. ..	...	...	...	...	...	...	...	...	...	...	...
—— asterianus, *D'Orb*.	...	...	...	...	...	...	...	...	...	*	...
—— gracilis, *D'Orb*..............	...	...	...	...	...	...	*	...	...	...	*
—— Robertianum,* *D'Orb*.	...	...	...	...	...	...	...	...	...	...	...
Nautilus albensis, *D'Orb*.	...	...	...	...	...	...	...	...	...	...	...
—— Bouchardianus, *D'Orb*. ...	*	...	...	...	...	...	...	...	*	...	...
—— Clementinus, *D'Orb*.	*	...	*	...	*	*	*	...	*	...	*
—— Deslongchampsianus, *D'Orb*.	...	...	...	...	...	...	...	...	...	...	...
—— elegans, *Sow*................	...	...	...	...	...	...	...	...	...	...	...
—— expansus, *Sow*...............	...	...	...	...	...	...	...	...	...	...	...
—— inæqualis, *Sow*.	...	...	...	...	...	...	...	...	...	...	...
—— lævigatus, *D'Orb*.	...	...	...	...	...	...	...	...	...	...	...
—— Largilliertianus, *D'Orb*....	...	...	...	...	...	...	...	...	...	...	...
—— Montmollini ?, *Pict*.	...	...	...	...	...	...	...	...	...	...	...
—— radiatus, *D'Orb*.	...	...	...	...	...	...	...	...	...	...	...
—— Sowerbyanus, *D'Orb*.	...	...	...	...	...	...	...	...	...	...	...
——, sp. nov.	...	...	...	...	...	...	...	...	...	...	...
Ptychoceras, sp.	...	...	...	...	...	...	...	...	...	...	...
—— adpressus, *D'Orb*.	...	...	...	...	...	...	...	...	...	...	...
Scaphites æqualis, *Sow*.	...	*	...	...	...	...	...	...	...	...	...
—— Hugardianus, *D'Orb*.	...	...	...	...	...	...	...	...	...	...	...

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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
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Scaphites Meriani, *Pict. & Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— simplex, *Browne*	...	...	...	...	...	...	...	...	...	...	...
Turrilites Archiacianus, *D'Orb.*											
—— Asterianus, *D'Orb.*											
—— Bergeri, *Brong.*	...	...	...	...	...	...	...	...	...	...	...
—— bituberculatus, *D'Orb.* ...											
—— catenatus, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— costatus, *Lam.*	...	...	...	...	...	...	...	...	...	...	...
—— elegans, *D'Orb.*	...	*	...	...	...	...	...	...	...	...	...
—— Emericianns, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	...
—— Greslyi, *Pict. & Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— Hugardianus, *D'Orb.*	...	...	...	...	...	*	...	...	...	...	...
—— intermedius, *Pict. & Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— Puzozianus, *Pict. & Camp.*	...	...	...	...	...	...	...	...	...	...	...
—— Senequierianus, *D'Orb.* ...											
—— Vibrayeanus, *D'Orb.*	...	...	...	...	...	...	...	...	...	...	*
——, sp.	...	...	...	...	...	...	...	...	...	...	...
Pisces.											
Acrodus, sp.	...	...	...	...	...	...	...	...	...	...	...
Corax falcatus, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
Drepanephorus canaliculatus, *Eg.*	...	...	...	...	...	...	...	...	...	...	...
Edaphodon crassus, *Newton* ...	...	...	...	...	...	...	...	...	...	...	...
—— laminosus, *Newton*	...	...	...	...	...	...	...	...	...	...	...
—— Reedii, *Newton*	...	...	...	...	...	...	...	...	...	...	...
—— Sedgwickii, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
Enchodus, sp.	...	...	...	...	...	...	...	...	...	...	...
Fish: ear-bones, scales, vertebræ, &c.	*	*	...	*	*	...	*	...	...	...	*
——: jaw (undescribed)	...	...	...	...	...	...	*				
——: „ (undescribed)	...	...	...	...	...	...	...	...	...	...	...
——: tooth (undescribed)	...	...	...	...	...	...	...	...	...	...	...
——: „ (undescribed)	...	...	...	...	...	...	...	...	...	...	...
Hybodus, teeth and dorsal spine	...	...	...	...	...	...	...	...	...	...	...
Ischiodon											
Ischyodus brevirostris, *Ag.* (= Agassizii, *Bensted*)	...	...	...	...	...	...	...	...	...	...	...
—— incisus, *Newton*	...	...	...	...	...	...	...	...	...	...	...
—— latus, *Newton*	...	...	...	...	...	...	...	...	...	...	...
—— planus, *Newton*	...	...	...	...	...	...	...	...	...	...	...
Lamna acuminata, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
—— gracilis, *Ag.*	...	...	...	...	...	...	...	...	...	..	...
—— subulata, *Pict. et Camp.* ...	...	...	...	...	...	...	...	...	...	...	...
Odontaspis Bouchardi, *Sauv.* ...	...	...	...	...	...	...	...	...	...	...	...
—— Bronnii, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
—— raphiodon, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
Otodus appendiculatus, *Ag.* ...	...	*	...	...	...	*	...	...	...	...	...
—— subinflata, *Ag.*	...	...	...	...	...	...	...	...	*	...	*
Oxyrhina heteromorpha	*										
—— macrorhiza, *Pict. et Camp.*	...	...	...	...	...	...	...	...	...	...	...
Pachyrhizodus glyphodus, *Blake*	...	...	...	...	...	...	...	...	...	...	...

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	Junction.	Lower Gault.						C. L. G.	W. L. G.	G. d'E.	A. du G.
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	I.	II.	III.	IV.	V.	VI.	VII.				
Pisodus: a palate	...	...	...	...	...	*					
Ptychodus: a palate	...	...	...	...	...	...	...	...	...	...	...
Pycnodus: tooth	...	...	...	...	...	...	...	...	...	...	...
Saurocephalus lanciformis, *Harlan*	...	...	...	...	...	...	...	*	...	...	...
—— striatus, *Ag*	...	...	...	...	...	...	...	...	...	...	...
Saurodon Leanus, *Hays*											
Sphenodus longidens, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
—— planus, *Ag.*	...	...	...	...	...	...	...	...	...	...	...
Thrissopater salmoneus, *Günther*											
Reptilia.											
Chelonian bones	...	...	...	...	...	...	...	...	...	...	...
Crocodilian ? egg	...	...	...	...	...	...	...	...	...	...	...
Icthyosaurus campylodon, *Carter*	*	...	...	...	...	...	...	*	...	...	...
Mauisaurus Gardneri, *Seeley*	...	*									
Plesiosaurus latispinus, *Owen*	...	...	...	...	...	...	...	...	...	...	...
—— bones	*	...	...	...	...	...	...	...	...	...	...
Polyptychodon interruptus, *Owen*	...	...	...	...	...	...	*	...	...	...	...
Pterodactylus compressirostris	...	...	...	...	...	...	*				
—— Daviesii, *Owen*	...	...	...	...	...	...	...	...	...	...	...
—— Sedgwickii	...	...	...	*	...	...	...	...	...	...	...
Rhinochelys (lower jaw), *Seeley*	...	...	...	...	...	...	...	...	...	...	...
Pearl	...	...	...	*							
Pebbles (quartz)	*	*	...	...	...	...	*	...	...	...	...

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